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THE GRADUATE SCHOOL

OF THE

UNIVERSITY OF ILLINOIS

Announcements for

1928-1929

PUBLISHED BY THE UNIVERSITY OF ILLINOIS
URBANA

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CONTENTS

PAGE

Board of Trustees 2
University Calendar 5, 6
Executive Faculty 7
History and Organization 9
Admission 9
Character of Graduate Work 9
Registration 9
  Residence 11
Masters' Degrees 12
  In Arts and Science 12
  In Engineering 14
The Doctor's Degree 15
  Period of Study 16
  Examinations 16
  Thesis 17
  In Engineering 17
Scholarships and Fellowships 18
Libraries 19
Fees and Expenses 20
Graduate Club 21

Departments of Instruction

Accountancy 22
Agronomy 23
Animal Husbandry 24
Architecture and Architectural Engineering 26
Astronomy 26
Bacteriology 27
Botany 28
Business Law 30
Business Organization and Operation 30
Ceramic Engineering 31
Chemistry 33
Civil Engineering 38
Classics 40
  Greek 40
  Latin 40
Dairy Husbandry 41
Economics 42
Education 46
Electrical Engineering 48
English 49
  Language and Literature 50
  Rhetoric 51
  Public Speaking 51
  The Scandinavian Languages 51

867301

PAGE
Entomology ... 52
Farm Organization and Management ... 53
Genetics (See Zoology) ... 54
Geology ... 54
Germanic Languages and Literature ... 56
Greek (See Classics) ... 57
History ... 57
Home Economics ... 61
Horticulture ... 62
Library Science ... 63
Mathematics ... 64
Mechanical Engineering ... 66
Mechanics, Theoretical and Applied ... 67
Meteorology (See Geology) ... 68
Mineralogy (See Geology) ... 68
Mining Engineering ... 68
Philosophy ... 69
Physics ... 70
Physiology ... 73
Political Science ... 73
Psychology ... 75
Railway Engineering ... 76
Romance Languages and Literatures ... 77
French ... 77
Italian ... 78
Spanish ... 78
Romance Philology ... 79
Sociology ... 79
Transportation ... 81
Zoology ... 81
Index ... 85

GRADUATE SCHOOL CALENDAR

SECOND SEMESTER

1928	
Feb. 3, 4, Fri., Sat.	Registration days
Feb. 8, Wed., 8 a.m.	Instruction begins
Mar. 1, Thur.	Last day for applications for Scholarships and Fellowships for 1928-1929
Apr. 5, Thurs., 11 a.m.	Easter recess begins
Apr. 10, Tues., 1 p.m.	Easter recess ends
Apr. 27, Fri.	Preliminary examination in French
May 1, Tues.	Last day for candidates for professional engineering degrees to deposit completed theses
May 1, Tues.	Last day for filing applications for Masters' degrees to be conferred in June and August[1]
May 4, Fri.	Preliminary examination in German
May 16, Wed.	Last day for candidates for the degree of Ph.D. in June, to deposit theses
May 28, Mon.	Semester examinations begin
May 31, Thurs.	Last day for candidates for the degree of A.M. and M.S. in June to deposit theses
June 6, Wed.	Semester examinations end
June 13, Wed.	Fifty-seventh Annual Commencement

SUMMER SESSION

1928	
June 18, Mon.	Registration Day
June 19, Tues.	Summer Session begins
July 4, Wed.	A legal holiday
July 28, Sat., 12 m.	Last day for candidates for degrees in August to deposit theses
Aug. 10, 11, Fri., Sat.	Final examinations

FIRST SEMESTER

1928	
Sept. 14, 15, Fri., Sat.	Registration Days
Sept. 17, Mon.	Last day for candidates for the degree of A.M. and M.S. in October, to deposit theses
Sept. 19, Wed., 8 a.m.	Instruction begins
Sept. 21, Fri.	Preliminary examination in French
Sept. 28, Fri.	Preliminary examination in German
Nov. 1, Thurs.	Last day for candidates for degrees in June, to announce thesis subjects

[1]The attention of students registered in the Summer Session only is called to page 13, Degrees in August.

Nov. 5, Mon.	Last day for candidates for professional engineering degrees to file statements of professional study and experience
Nov. 29, Thurs.	Thanksgiving Day
Dec. 22, Sat., 11 a.m.	Holiday recess begins
Dec. 31, Mon., 5 p.m.	Last day for candidates for professional engineering degrees to submit outlines of theses

1929

Jan. 4, Fri., 1 p.m.	Holiday recess ends
Jan. 14, Mon.	Last day for filing applications for degrees to be conferred in February
Jan. 14, Mon.	Last day for candidates for the degree of Ph.D. in February to deposit theses
Jan. 19, Sat.	Preliminary examination in French
Jan. 22, Tues.	Semester examinations begin
Jan. 28, Mon.	Last day for candidates for the degrees of A.M. and M.S. in February to deposit theses
Jan. 30, Wed.	Semester examinations end
Feb. 2, Sat.	Preliminary examination in German

SECOND SEMESTER

Feb. 1, 2, Fri., Sat.	Registration days
Feb. 6, Wed., 8 a.m.	Instruction begins
Mar. 1, Fri.	Last day for applications for Scholarships and Fellowships for 1929-1930
Mar. 28, Thurs., 11 a.m.	Easter recess begins
Apr. 2, Tues., 1 p.m.	Easter recess ends
Apr. 26, Fri.	Preliminary examination in French
May 1, Wed.	Last day for candidates for professional engineering degrees to deposit completed theses
May 1, Wed.	Last day for filing applications for Masters' degrees to be conferred in June and August[1]
May 3, Fri.	Preliminary examination in German
May 15, Wed.	Last day for candidates for the degree of Ph.D. in June, to deposit theses
May 27, Mon.	Semester examinations begin
May 29, Wed.	Last day for candidates for the degree of A.M. and M.S. in June to deposit theses
June 5, Wed.	Semester examinations end
June 12, Wed.	Fifty-eighth Annual Commencement

[1]The attention of students registered in the Summer Session only is called to page 13, Degrees in August.

THE EXECUTIVE FACULTY

DAVID KINLEY, PH.D., LL.D., PRESIDENT OF THE UNIVERSITY

ARTHUR HILL DANIELS, PH.D., *Professor of Philosophy and Dean of Graduate School*

ROGER ADAMS, PH.D., *Professor of Organic Chemistry*

ERNEST BERNBAUM, PH.D., *Professor of English*

WILLIAM LEONIDAS BURLISON, PH.D., *Professor of Crop Production*

EDWARD HERBERT CAMERON, PH.D., *Professor of Educational Psychology*

ARTHUR BYRON COBLE, PH.D., *Professor of Mathematics*

MAXWELL JAY DORSEY, PH.D., *Professor of Pomology*

HERBERT FISHER MOORE, M.M.E., D.SC., *Research Professor of Engineering Materials*

REXFORD NEWCOMB, A.M., M.ARCH., A.I.A., *Professor of the History of Architecture*

WILLIAM ABBOTT OLDFATHER, PH.D., *Professor of Classics*

WILLIAM SPENCE ROBERTSON, PH.D., *Professor of History*

HENRY PERLEY RUSK, M.S., *Professor of Cattle Husbandry*

FRED WILBUR TANNER, PH.D., *Professor of Bacteriology*

ARTHUR CUTTS WILLARD, B.S., *Professor of Heating and Ventilation*

GEORGE PHILIP TUTTLE, JR., B.S., *Registrar, Secretary of the Faculty*

HISTORY AND ORGANIZATION

The University of Illinois offered facilities for advanced study and research in various lines as early as 1872. Organized graduate instruction, however, under the name of the Graduate School, was first undertaken in 1892. In 1894 the administration of the school was vested in the Council of Administration, and the Vice-President of the University became Dean of the School. In 1906 the Graduate School was organized as a separate faculty, consisting of a dean and members of the University faculty assigned to this duty by the President.

By action of the Trustees the teaching faculty of the Graduate School includes all members of the University faculty who give instruction in approved graduate courses. The affairs of the School, however, are in charge of the Executive Faculty appointed each year by the President.

ADMISSION

Admission to the Graduate School may be granted to graduates of institutions whose requirements for the bachelor's degree are substantially equivalent to those of the University of Illinois, and to applicants from other institutions approved by the Executive Faculty, as hereinafter provided. *Admission to the Graduate School does not, however, imply admission to candidacy for an advanced degree, and gives no right or claim to be so admitted. Such candidacy is determined by the Faculty after the student has demonstrated by his work here, for from two to five months, that he has the ability to do major work of graduate character. A mere accumulation of "credits" or "grades" is not sufficient.*

Admission to graduate courses may be granted only to those who have had the requisite undergraduate work in those courses or departments. But a student of mature age who satisfies the Dean and the Department concerned of his ability to pursue graduate work in a given line may be enrolled in particular graduate courses, without reference to a degree, and permitted to carry on such study or investigation under the direction of a department of the University as the department shall recommend and the Dean approve.

Application blanks for admission may be secured from the Registrar of the University. Every applicant must submit with his application for admission an official transcript of his college record.

CHARACTER OF GRADUATE WORK

The principal aim of graduate study is the development of the power of independent work and the promotion of the spirit of research. Each candidate for a degree is expected to have a wide knowledge of his subject and of related fields of work; for the graduate student is not expected to get from lecture and laboratory courses all the knowledge and training necessary to meet the requirements for his degree.

REGISTRATION AND PROGRAM OF STUDY

The following regulations concerning registration and program of studies are laid out primarily for first-year students. Second-year and third-year graduate

students fill out their programs irrespective of the unit value of courses, according to their needs, under the advice of their instructors.

Registration.—Each graduate student must register at the beginning of each semester. The registration of a new student may be accepted at any time provided the student is prepared to take up courses actually under way. Credit towards the fulfillment of the residence requirement dates, however, from the time of registration and not from the beginning of the semester or year in which the student enters. Registration will not be permitted later in the year than April 1, except in the case of students who expect to continue through the summer session, or are returning to complete a year's work which has been interrupted by unavoidable circumstances.

A new student must fill out in duplicate an application for admission and submit it to the Registrar, from whom, after the approval of his application, he will receive a card of admission and a study-list which will give details of procedure in registering. He should fill out the study-list after consultation with his adviser, or the person in charge of his major work, and also with the instructors whose courses he wishes to elect. *In all cases, registration must be completed within two weeks.* Otherwise it is subject to a fee of five dollars.

Changes in Study-Lists.—A graduate student is expected to plan his work so carefully that changes in his study-list during the semester will not be necessary. When a change seems advisable, however, it may be permitted without fee if made within three weeks of the date of registration. After that date a fee of one dollar is charged for each change, except that the total charge for rearrangement authorized on any one change slip shall not exceed two dollars.

Advanced Undergraduate Courses Open to Graduate Students.—

1. *Courses not open to students below senior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as unit courses for graduate credit, or as half-unit courses when listed for less than four hours of undergraduate credit.

2. *Courses open to students of junior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as half-unit courses for graduate credit, or as quarter-unit courses when listed for two to three hours undergraduate credit. Courses to which sophomores are regularly admitted may not be taken for graduate credit, either major or minor.

Seniors and Graduate Study.—If at the beginning of the second semester of his senior year a student who has been in residence at least one year is within five hours of a bachelor's degree, he may be permitted to register for courses which may count for residence for a master's degree, provided his program does not require more than twelve formal class, lecture, or laboratory exercises a week, and is approved by the Dean at the time of registration.

Miscellaneous and Listeners' Courses.—Graduate students are permitted under proper circumstances to attend classes as listeners, and to elect miscellaneous subjects, that is, courses which do not count toward an advanced degree. Listeners' cards may be obtained at the Dean's office. A graduate student in full standing and carrying a minimum program, may be permitted, under proper circumstances, to attend one class as a listener, or to elect one miscel-

laneous subject (that is, a course which does not count towards an advanced degree). No subject is open as a listener's or miscellaneous course unless it has a specific educational bearing on the student's major or minor subjects of study.

A student who elects a miscellaneous course is required to register in it, do the work, and pass the semester examinations, unless he is permitted to withdraw under the rules. A student who has a listener's card is not permitted to participate in the class work or the examination.

No student may register for a full minimum program of work for graduate credit if it is necessary for him to carry at the same time more than one miscellaneous subject and to visit one course.

Students on the Staff.—Assistants and others on the University staff who undertake to do graduate work are permitted to take an amount of work determined by the terms of their employment. Such a student, if required by his engagements to teach more than five classes a week or to have laboratory work or supervision exceeding ten hours a week, may not receive his master's degree at the end of one year, nor his doctor's degree at the end of three.

Residence and Work Done Elsewhere.—Continuous residence and study are required of all members of the Graduate School, unless they are granted leave of absence by the Dean, upon recommendation of the professor in charge of their work, for the purpose of carrying on elsewhere studies or investigation in the line of work for their degrees.

Graduate Study in the Summer.—Graduate students in the Summer Session are subject to the same scholastic requirements as those in the regular University year. Their study-lists must be approved by the Dean of the Graduate School, or his representative. Attendance during four out of six consecutive summer sessions, or one semester and two summer sessions, is considered the equivalent of one year in residence. The faculty is unwilling to accept summer-session work beyond the master's degree towards the doctor's degree, except in the case of a student who works in a summer session preceding or following a regular year's attendance at the University. In no case may the last year's work for the doctorate be done in disconnected summer sessions.

No course offered in the Summer Session may be taken for credit towards a higher degree unless it is described in the summer-session circular as accepted for that purpose.

Summer Work in Medical Sciences.—Graduate courses in medical sciences are offered in the summer quarter between June and September at the College of Medicine of the University of Illinois in Chicago. Circulars describing the courses offered and conditions of admission and work may be obtained from the Secretary of the College of Medicine, Congress and Honore Streets, Chicago.

Failures.—A graduate student who fails in any course in his major subject cannot secure his degree in the same year in which the failure occurred. No condition examinations are given graduate students.

Withdrawal.—If after registration a graduate student wishes to withdraw from any course or to add other work, he must first secure the necessary papers from the Dean's office. See the regulations concerning changes in study-lists, page 10. If he wishes to withdraw from the University he must get clearance papers at the Dean's office.

DEGREES

Masters' Degrees

Character of Masters' Degrees.—The master's degree conferred depends upon the character of the bachelor's degree. The usual practice is that A.M. shall follow A.B., and that M.S. shall follow B.S. However, this practice may be departed from in cases where the undergraduate course of study of the candidate was of a kind for which some reputable institutions in this country give A.B., while others give B.S.

Amount of Work Required.—Candidates for the degree of Master of Arts or Master of Science are required to do at least one full year's work in residence, including a thesis. By this is meant from four to five unit courses each semester or their equivalent. A unit course is one which requires ten hours of time a week through one semester, or a minimum of 180 hours, irrespective of the mode of distribution of that time in class work, laboratory work, and private study. Four such courses or their equivalent constitute a full *minimum* program for one semester, and eight such courses, or their equivalent, constitute the *minimum formal* year's work accepted for a master's degree. Only first rate students are permitted to secure a degree with this minimum program.

Unless otherwise permitted, every student must take each semester at least one course open to graduate students only (courses numbered 100 and upwards).

In the first year of his graduate study each student is required to attend a minimum of four formal class, lecture, or laboratory exercises a week. In no case is he permitted during his course to attend more than twelve a week, without permission.

Work Done Elsewhere.—Members of the staff and high-school teachers residing and employed in Urbana or Champaign who have done graduate work in approved institutions elsewhere may secure credit not to exceed four units towards the master's degree by passing examinations in that work. They may complete the work for the degree by securing at least four units more while registered in the Graduate School for not less than one academic year.

Students in zoology who take work in a marine or fresh-water biological laboratory or station are permitted to offer not less than six weeks nor more than nine weeks of such work in partial fulfillment of the requirement for the master's degree.[1] This privilege is granted only when the work is done with the permission of the faculty (secured in advance), in an approved laboratory, and under instructors accepted by the faculty. Credit for such work may be secured by examination after the student has submitted an official certificate of attendance at the laboratory or station, together with a full written report of the work done there. No candidate for the master's degree may avail himself of this provision who is not registered in the Graduate School for one full academic year, during which he shall do the rest of the work necessary for his degree.

Similar arrangements are made, under similar conditions, for students of geology in connection with Geological Surveys.

Majors and Minors.—A candidate for a master's degree may do all his work in one subject, or he may select a major and one minor, or a major and

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[1]The experience at a marine laboratory which, as indicated above, is optional with the candidate for the master's degree, is required of all candidates for the doctorate in zoology.

two minors. A major or minor denotes the field of knowledge of a department, or such part thereof as constitutes a separate and independent division of that field. For a master's degree a major is at least half the work, or a minimum of four units, for one year. Less than one unit may not be counted as satisfying the requirements of a minor without the approval of the department concerned.

Foreign Language.—The ability to use one or more of the modern languages ordinarily studied in the undergraduate curriculum is expected of all candidates for the master's degree, and in some lines of study is required. On this matter students should consult the heads of the departments in which their major subjects lie.

Masters' Theses.—Each candidate for a master's degree is required to present a thesis on some subject approved by the professor in charge of his major work and the Executive Faculty of the Graduate School. Such approval, except in case of students working for masters' degrees in summer sessions only, must be secured not later than the end of the sixth week of the year of residence.

Students working for masters' degrees exclusively in summer sessions must announce their thesis subjects not later than the beginning of their third session in residence. The requirement of a thesis may be waived, however, on the recommendation of the head of the department in which the student is doing his major work and the approval of the Dean, provided application to waive the thesis is made at the time for announcing thesis subjects. A student excused from writing a thesis must replace it with additional courses of instruction.

No one will be excused from writing a thesis unless one-half of his program of studies consists of courses numbered 100 and upwards.

The thesis required from a candidate for a master's degree ordinarily will demand one-fourth of the student's time and may not exceed one-third of it. The thesis must be typewritten, on "thesis paper,"[1] and the title page must be printed. The thesis in its final form, together with a certificate of approval by the proper officer, must be left by the professor in charge at the Dean's office at least two weeks before the date on which the degree is to be conferred. No article prepared for another use, or previously published, will be accepted as a thesis.

Applications for Degrees.—Each candidate for the degree of Master of Arts or Master of Science shall file an application for the degree on a blank provided for the purpose, to be had at the Dean's office. For the dates of applications and of deposition of theses, consult the calendar at the beginning of the bulletin.

Degrees in August.—Students who expect to become candidates for the master's degree in August may be recommended at the June meeting of the Senate subject to the successful completion of the work for which they are to register in the Summer Session. However, in order to avail themselves of this privilege, students must file with the Dean before the June meeting of the Senate an exact statement of the work necessary to complete the requirements for the degree. Blanks for this purpose may be secured at the Dean's office.

Thesis Work on Leave of Absence.—Under proper conditions a student may be permitted to complete the last fourth of his work, if devoted to his thesis, under leave of absence for a period not to exceed the equivalent of two

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[1]No other will be accepted by the Dean. "Instructions for the preparation of theses" may be obtained at the Dean's office.

semesters. To get such permission the student must have secured credit for at least six units; must petition for the privilege; must submit to the Dean an outline of the proposed investigation, approved by the head of his major department; and must submit satisfactory evidence that adequate facilities are available to him at the place where he intends to do the proposed work. Approval on all these points must be obtained one collegiate year before the thesis is due. Immediately following approval the student must register and pay an incidental fee of $20.00.

Grades.—Students' work is graded in five classes, A, B, C, D, and E. The last indicates a failure. D indicates unsatisfactory, though passable work.

A student who receives two units of a grade below B during his first year of graduate work may not complete the first year of residence by carrying the minimum program of eight units for the master's degree. Three units of a grade below B disqualify a student as a candidate for a degree.

A failure or absence from examination in any course or failure in any other examination prescribed by the department of the major may prevent the conferring of the degree; and, as already indicated, failure in any course in the major field precludes the conferring of the degree in the same year.

Second Degrees in Engineering

Two classes of second degrees are open to graduates of the College of Engineering, namely, academic and professional.

The academic second degree in engineering is Master of Science, following Bachelor of Science, in architecture, architectural engineering, civil engineering, electrical engineering, etc. This degree is conferred in accordance with the regulations described above for *academic work in residence only.*

The *professional* second degrees in engineering are as follows:

Master of Architecture, after B.S. in architecture.

Architectural Engineer, after B.S. in architectural engineering.

Ceramic Engineer, after B.S. in ceramic engineering.

Civil Engineer, after B.S. in civil engineering or in railway civil engineering.

Electrical Engineer, after B.S. in electrical engineering or in railway electrical engineering.

Mechanical Engineer, after B.S. in mechanical engineering or in railway mechanical engineering.

Engineer of Mines, after B.S. in mining engineering.

Professional degrees in engineering may be conferred on two classes of candidates: (1) those who have received an academic degree in engineering from the University of Illinois; (2) those who have received an academic degree in engineering from other institutions of equal standing and who have been members of the teaching or research staff of the College of Engineering or Engineering Experiment Station of the University of Illinois for at least three years prior to the conferring of the professional degree.

A candidate declares his candidacy by filing with the Dean of the College of Engineering, as chairman of the committee in charge, a detailed statement covering his professional engineering experience. This statement must be made upon a standard form supplied by the Dean of the College of Engineering, as chairman of the committee in charge, and must be filed not later than the first Monday in November preceding the commencement at which the candidate ex-

pects to receive the degree. No statement of experience will be considered by the committee which does not show that the candidate has had a minimum of four years of acceptable engineering experience after receiving the degree of Bachelor of Science, and that for at least three years he has been in responsible charge of engineering work. Responsible charge in engineering teaching may be considered as responsible charge of work. In determining the acceptability of the engineering experience of the candidate the committee will be guided by the character of his professional work and the degree of responsibility involved, and will take into consideration such evidences of professional ability and growth as may be shown by his investigation of engineering problems, his contributions to technical literature and his membership and activity in engineering societies.

If the professional experience of the candidate is accepted he must submit for approval, prior to December 31, an outline of his proposed thesis. The completed thesis, in the form prescribed in the "instructions for the preparation of masters' and doctors' theses," must be deposited with the Dean of the College of Engineering not later than May 1. The candidate must present himself at commencement in order to receive the degree.

A candidate for a professional engineering degree must pay the incidental fee of fifty dollars on being notified that his professional experience is accepted as qualifying him to enter as a candidate for the degree. No one will be enrolled as a candidate for the degree at the following commencement who does not pay his fee at this time. When a candidate for a professional engineering degree has once been accepted and paid his fee, he is eligible to receive the degree at any time within five years, without additional fee, on completion of the requirements; provided, however, that unless he completes the requirements within two years his name will be dropped from the list of candidates and in order to receive the degree within the five-year period he must register once more.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Major and Minor Subjects.—A member of the Graduate School who desires to become a candidate for the degree of Doctor of Philosophy is required to pursue a major subject in the department in which his research lies. He is also required to choose one minor subject, or he may choose two. If one minor only is chosen it must be taken in a department of study other than that of the major, and credit for it may be earned by work representing not less than four units, or one-sixth of the total residence required for the doctorate. If two minors are chosen, one must be a subject closely related to the major. With the approval of the adviser it may be a division of the major field of study. If the second minor is outside the department of major study, it may be satisfied by work representing not less than two units or one-fourth of a year of residence.

Except by special permission of the Dean the preliminary examination in major and minor subjects may not be taken until the minor work has been done.

Method of Computing Residence.—Credit for a full year of graduate work means that the student has during that time devoted all his working time and energy to study of a graduate grade. After the first year of residence credit is not recorded in units, and there is no fixed correspondence between credit and courses as in undergraduate work. Thus it is possible for a second-year student

to devote all his time to one course and his research; and for a third-year student to devote all his time to his research alone.

Period of Study.—The *minimum* period of study required for securing the degree of Doctor of Philosophy is three years, during which the student is required to devote all his working time to his studies. All three years must be spent in resident graduate study at some accredited educational institution and either the first two or the last one of the three must be spent at the University of Illinois. The degree is conferred, however, not for residence during a certain period, but for scholarly attainments and power of investigation, as proved by a thesis and examinations.

Work Done in Other Universities.—Credit for graduate work done in other universities is not "transferred." However, it may be accepted on examination as equivalent to resident work at the University of Illinois, provided the institution in which it was done is of high standing.

Examinations

Preliminary.—A. In major and minors.—Towards the end of his second year of study, or by special permission, at the beginning of his third year, (not later than the first Saturday in October) the candidate for the degree must submit to a preliminary examination, in order to determine whether he will be accepted as a candidate for the degree in the following year. This examination is intended to test the student's knowledge of the fields of his major and minor subjects of study only. It is partly oral, and may be wholly so.

The student will not be admitted to his preliminary examination until the faculty is satisfied that he has finished substantially the equivalent of two years' graduate work. He must do a full year's graduate work between his preliminary examination and the completion of his work for the doctorate.

B. In Languages.—The candidate will be required to demonstrate his ability to read French and German and other languages needed in his work. This test of proficiency in the use of French and German must be passed before the student is admitted to the preliminary examination in major and minor subjects. For the dates of these language examinations consult the calendar at the beginning of this bulletin.

Application for admission to these examinations must be made a week, at least, in advance of the date of the examination.

Final Examination.—At least two weeks before the time when the degree is conferred, the candidate must submit to a final examination, given by a committee appointed by the Dean. This examination is primarily on the research work of the student, as embodied in his thesis, but it is not confined to that. It extends to the whole field of study of the candidate. It will not be confined to the courses which the candidate has attended in the University of Illinois only, if he has done part of the work elsewhere; nor even to the field covered by the courses specifically taken in this or other universities; but will be so conducted as to determine whether the candidate has a satisfactory grasp of his major subject as a whole, and a general acquaintance with the fields of knowledge represented by his course of study.

The final examination may not be divided. The examination must be taken all at one time even tho it requires several sessions.

If after having passed his preliminary examination, he fails in the third year of his study to meet the expectations of the professors in charge of his work, or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

Other Examinations.—Before the candidate is admitted to the final examination and the defense of his thesis, he may be required to take any other examination, oral or written, that is thought proper by the various departments in which he has studied.

The above examinations are in addition to those in the courses for which the student is registered. These must be taken at the time for which they are set in the examination schedule.

Thesis.—The power of independent research must be shown by the production of a thesis on some topic connected with the major subject of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or as many of them as may wish to question him about it, in connection with his final examination.

The subject of the thesis should be chosen not later than the end of the second year of residence and must be submitted for formal approval by the faculty not later than six weeks from the beginning of his third year of residence.

A typewritten copy of the complete thesis, *on thesis paper,*[1] and in final form must be deposited in the office of the Dean for presentation to the examining committee not later than two weeks prior to the final examination and not less than four weeks before the time when the degree is conferred. At the same time, the candidate must deposit with the Dean a manuscript of the essential part, or an abstract, or a digest of his thesis, in condition for publication at a cost not to exceed seventy-five dollars ($75). The manuscript must be sufficient to show the method followed, the evidence used and the conclusions reached in the investigation, and must bear the approval of the department and the Executive Faculty of the Graduate School.

The candidate must pay to the Comptroller before graduation the sum of seventy-five dollars ($75) out of which the University will print at least one hundred copies of this manuscript for circulation by the University, unless the thesis entire or in abbreviated form is published by the author or is accepted for publication by a standard journal or publisher within a year from the date of graduation. In the latter event, and after one hundred copies have been presented to the University by the writer, the cash deposit shall be returned to him.

The typewritten and printed forms of the thesis must comply with the regulations given in "instructions for the preparation of masters' and doctors' theses," copies of which may be obtained at the Dean's office.

Doctor's Degree in Engineering.—The degree of Doctor of Philosophy in Engineering is offered in certain lines of academic work of a high scholastic type in engineering science for students who wish to prepare themselves as teachers, investigators, and experts.

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[1]No other will be accepted by the Dean.

The general requirements for this degree, as to preliminary education, linguistic attainments, etc., are the same as in other lines.

The following lines of engineering science, or others approved by the Graduate School, may be elected as majors:

Engineering mechanics
Steam engineering
Hydraulic and sanitary engineering
Electrical engineering
Heating and ventilation engineering
Railway engineering
Masonry construction and structural engineering
Coal-mining engineering
Ceramic engineering

The first minor may be any of the above or one of the following sciences or an authorized combination of two of them:

Theoretical mechanics
Mathematics
Thermodynamics
Bacteriology
Chemistry
Geology
Physics (Experimental or mathematical)
Zoology
Botany
Economics

The second minor should be in other than engineering subjects.

SCHOLARSHIPS AND FELLOWSHIPS

A number of scholarships and fellowships have been established by the Trustees of the University. To first-year graduate students of ability and promise, there are open a number of scholarships with a stipend of $300 each and freedom from tuition, incidental, and laboratory fees.[1] To second-year and third-year graduate students, that is, those who have had one or two years of graduate study, there are open fellowships with stipends of $400 and $500, with freedom from the above-mentioned fees. The larger stipends are given only to students who are expected to take their degrees within the year. Each holder of a fellowship or scholarship must pay the matriculation fee of ten dollars, unless he holds a first degree from the University of Illinois, and also the diploma fee of ten dollars on receiving his diploma.

Candidates for these scholarships and fellowships must be graduates of the University of Illinois, or of colleges or universities having equivalent requirements for bachelors' degrees.

Application must be made on blanks to be obtained from the Dean of the Graduate School. These application forms should be sent to the Dean of the Graduate School as early as possible in February of the academic year preceding that for which the fellowship is desired. No application will be considered if received later than March first, until after April fifteenth, the date

[1]Up to a certain amount.

when appointees from the first list of applications must accept or refuse their appointments.

Persons appointed are notified on April first and must send the Secretary of the Board of Trustees notice of their acceptance or refusal by April fifteenth; and must agree that, if accepted, the appointment will not be resigned to take a similar one in any other institution during the year for which it is awarded.

Nominations to fellowships are made on the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself. Scholarships and fellowships are not given to candidates who are over thirty years of age at the time when the appointment is to be made.

For second-year fellowships, adequate preparation in French or German, and for third-year fellowships, adequate preparation in both French and German is required.

An appointment as honorary fellow, without stipend, may be made as specified for paid fellowships in the case of any one who has shown distinguished merit in his work.

LIBRARIES

The general University library, the library of the State Natural History Survey, and that of the State Geological Survey are all at the University in Urbana. The libraries of the School of Pharmacy and the College of Medicine are in Chicago.

These libraries contain 733,580 volumes, and 162,783 pamphlets. Of these 694,680 books and 155,333 pamphlets are in the libraries at Urbana; the rest are in Chicago. The library at Urbana also contains 3,014 maps and 7,796 pieces of sheet music. The departments at Urbana currently receive about 6,000 serials, while the College of Medicine and School of Pharmacy in Chicago receive 250.

The general library of the University is open daily, from 8 a. m. until 10 p. m. and on Sunday from 2:30 p. m. until 5:30 p. m.

A number of departmental and college libraries and reading rooms are maintained in various buildings on the campus; these libraries do not necessarily contain all the books in the respective subjects. In some instances they are primarily for the use of the graduate students and advanced undergraduate students in the departments using the respective buildings. The principal departmental libraries and reading rooms are the following:

Name of Library	*Location*	*Volumes*
Philosophy, Psychology, and Education	Lincoln Hall	16,000
Classics	Lincoln Hall	23,600
Modern Languages	Lincoln Hall	27,000
English	Lincoln Hall	16,400
History and Political Science	Library Building	22,100
Economics and Sociology	Lincoln Hall	24,000
Natural History	Natural History Hall	23,000
Law	Law Building	36,000
Commerce Reading Room	Library Building	2,800
Architecture, Ricker Library of	Architecture Building	5,800
Agriculture Reading Room	New Agriculture Building	12,000
Chemistry	Chemistry Building	11,000
Physics	Physics Building	1,600
Mathematics	Mathematics Building	6,100
Engineering	Engineering Hall	9,800

The Dittenberger Classical Library.—The University possesses the library of Wilhelm Dittenberger, at one time Professor of Classical Philology in the University of Halle. This library contains 5,600 items. It includes the works of the poets and prose writers, numerous works on grammar and history of liter-

ature, and between four and five thousand dissertations and programs on special topics. There are also many works dealing with other departments of classical philology, as epigraphy, history of ancient peoples, archeology, philosophy, history of art, geography, chronology, metrics, etc.

The Heyne Library of Germanics.—The library of Professor Moritz Heyne of the University of Göttingen was bought by the University. It contains about 5,200 volumes. The collection is rich in the general field of German philology and in lexicography. It has many rare first editions of works of German literature from the sixteenth, seventeenth, and eighteenth centuries and has sets of a number of rare periodicals.

The Gröber Library in Romance Languages.—The University also possesses the library of Professor Gröber of the University of Strassburg. This library contains about 6,500 titles.

The Vahlen Library, of the late Johannes Vahlen, contains about 10,000 volumes and is in itself an excellent working library in classical philological literature. It is well supplied with texts of Greek and Latin authors.

The Aron Library, collected by the late teacher and student of pedagogy, R. Aron, contains about 20,000 volumes. It is a scholarly collection of educational documents, among them many original and early editions, and furnishes first-hand material for the study of educational movements in Europe, especially in Germany, from the time of Luther and Comenius to the present. The collection of German "Fibeln" or school readers is unique, and the material for the history of juvenile songs and literature, the set of 17th and 18th century atlases, and the collection of rare hymn books and juvenilia make the collection very useful to students of education.

The Cavagna Library.—The library of the late Count Antonio Cavagna Sanigiuliani di Gualdana has been bought by the University. It is estimated that the library contains about 40,000 volumes, besides many maps, manuscripts, and prints, making a notable collection for the study of Italian history, literature, and art.

FEES AND EXPENSES

Except as noted below, graduate students pay fees as follows:

Matriculation fee	$10.00
Incidental fee, each semester, for residents of Illinois	25.00
All students, not residents of Illinois, pay, each semester an incidental fee of	37.50
Incidental fee for students registered for thesis work towards the master's degree on leave of absence	20.00
Diploma fee	10.00
For late registration	5.00
For change in study-list	1.00

All graduate students who have not matriculated as undergraduates at the University of Illinois pay the matriculation fee on entrance.

All graduate students pay the diploma fee.

No tuition or incidental fee is charged for graduate courses to scholars, fellows, or members of the corps of instruction or the staffs of the University libraries or of the scientific bureaus or experiment stations, who are appointed

by the Board of Trustees, nor for undergraduate courses on their study-lists if approved by the heads of the departments and by the Dean of the School as necessary or desirable for the proper completion of the work for the degree. Otherwise graduate students who take undergraduate courses must pay the proper undergraduate fee.

Each student working in the laboratories, or in the drafting or engineering classes, is required to pay a fee of from 50 cents to $15.00 in each course for chemicals and apparatus used, and for any breakage or damages. But no charges or deposits for laboratory materials are required from scholars, fellows, or members of the corps of instruction or scientific staffs mentioned above, except when breakage or consumption of materials exceeds a certain allowance.

Table board may be obtained at prices ranging from $7 a week.

Room rent, single room, ranges from $20 a month; double room, $12.50 a month, each person.

THE GRADUATE CLUB

The Graduate Club is an unofficial organization of the graduate students and faculty. Its purpose is to furnish an opportunity for those working in different departments to become acquainted with one another and thus counteract the tendency toward narrowness which intense specialization may sometimes induce.

DEPARTMENTS OF INSTRUCTION

Courses open to graduate students are of two classes. The first class is wholly of graduate grade, and the courses are numbered 100 upwards. The second class includes the courses classified as for graduates and advanced undergraduates. These carry numbers below 100. The courses numbered 100 and upwards are all accepted for major credit. Those of the other group are in many cases accepted for minor credit only. This is especially true of courses which are open to juniors.

All courses have certain prerequisites for admission. Inasmuch as the prerequisite preparation may be gained at other institutions from courses differing from those offering a similar preparation at the University of Illinois, so that a statement of prerequisites as given here would not be understood elsewhere, their description is omitted altogether. However, a student who wishes to enter a particular course must satisfy the department concerned that he has had in some form the prerequisites for admission to the course.

For the convenience of first-year students the credit value of graduate courses is given in units. These values have no significance for second-year and third-year students.

The credit received for "courses for graduates and advanced undergraduates" is in accordance with the regulations of the Graduate School (see page 10).

Students are admitted to graduate standing in agriculture who have had a thoro training in the sciences underlying agriculture, and who are otherwise eligible to the Graduate School, even tho their undergraduate course of study lacked to some extent the amount and kind of technical work in agriculture included in the course of study for the bachelor's degree in agriculture at the University of Illinois.

ACCOUNTANCY

A student may major in accountancy for the Master's degree only. The courses may be taken for minor credit by applicants for the Master's or Doctor's degree in other departments with the approval of the adviser. The courses in accountancy for graduates only may be selected by those who have had approximately 15 university credits in accountancy, including Accountancy 3a or its equivalent. Accountancy 4a is a prerequisite for 104; 3b for 110; 13 for 113; and 20 for 120.

The courses for graduates and advanced undergraduates may be taken by those who have had the equivalent of 12 university credits in accountancy.

Courses for Graduates

103. Advanced Theory and History.—*Twice a week; both semesters. One unit.*
Associate Professor LITTLETON

104. Accounting Systems.—*Twice a week; both semesters. One unit.*
Professor SCOVILL

110. Accounting Reports.—*Twice a week; second semester. One unit.*
Professor FILBEY

113. Governmental Accounting.—*Twice a week; second semester. One unit.*
Professor Morey

120. Income Tax Development.—*Twice a week; first semester. One unit.*
Professor Filbey

129. Thesis.—*Once a week; both semesters. One unit.*
Professor Filbey and members of the staff

Courses for Graduates and Advanced Undergraduates

3a. Advanced Accounting.—*Three times a week; either semester.*
Professors Filbey, Scovill, Associate Professor Littleton

3b. Auditing.—*Three times a week; either semester.*
Professors Filbey, Scovill, Associate Professor Littleton

4a. Cost Accounting.—*Twice a week; first semester.*
Associate Professor Schlatter

4b. Accounting Systems.—*Twice a week; second semester.*
Associate Professor Schlatter

5a-5b. C. P. A. Problems.—*Three times a week; both semesters.*
Professor Scovill

13. Governmental Accounting.—*Twice a week; either semester.*
Professor Morey

20. Income Tax Procedure.—*Twice a week; second semester.*
Professor Filbey

AGRONOMY

Students taking their major in agronomy must have had the major courses in agronomy, or the equivalent, offered to undergraduates in the College of Agriculture of the University of Illinois. Graduate students may specialize either in Soils or Crops. Courses 7, 22, and 28 are prerequisites for those specializing in Crops. Courses 25 and 28 are prerequisites for those specializing in Soils. Courses 10, or 11, or 13 will be required of all students specializing in Crops, and graduate credit will be allowed for them. Courses 7, 11, 22, and either 10 or 13 will be required of all students specializing in Soils. Graduate credit will be allowed for these courses. While everyone seeking a doctor's degree with agronomy as a major will be required to have a general knowledge of the whole field of agronomy, each student is expected to prepare a thesis in some one of the divisions, soil fertility, soil physics, soil biology, plant breeding, or crop production.

Students who are taking their major work in other departments and choose agronomy as a minor, must have had previously the work in chemistry, botany, and other fundamental sciences prerequisite for the agronomy courses taken.

Courses for Graduates

101. Soil Investigation.—*Twice a week; first semester. One unit.*
Professor DeTurk

104. Seminar in Agronomy.—*Once a week; both semesters. One-fourth unit.*
Heads of Divisions

111. Soil Biology.—*Once a week; first semester. One-half to one unit.*
Professor DeTurk

112. Plant Breeding.—*Three times a week; second semester. One unit.*
Associate Professor Woodworth

114. Crop Production.—*Once a week; both semesters. One-half to two units.*
Professor Burlison

118. Investigation.—A special problem is chosen by each student. Graduate students taking a thesis should so indicate in registering in Agronomy 118. *Both semesters. One-half to four units.* Professors Burlison, DeTurk, R. S. Smith, Associate Professor Woodworth

119. Experiment Station Problems.—See Animal Husbandry 103.
Professor Mumford

Courses for Graduates and Advanced Undergraduates

7. Farm Crops.—*Three times a week; second semester.*
Professor Burlison, Assistant Professor Dungan

10. Soil Physics.—*Lectures twice a week; laboratory once a week; second semester.* Professor R. S. Smith

11. Soil Biology.—Lectures, laboratory, assigned reading. *Three times a week; second semester.* Assistant Professor Sears

13. Soil Fertility.—Lectures, laboratory, assigned reading. Three times a *week; first semester.* Assistant Professor Sears

22. Plant Breeding.—*Three times a week; first semester.*
Associate Professor Woodworth

ANIMAL HUSBANDRY

Students entering graduate work in animal husbandry must have had a thoro training in the fundamental principles of the subject either in connection with or in addition to a course of study in agriculture substantially equivalent to that offered in this University.

Students desiring to specialize in animal breeding are referred to the Zoology Department for other courses in related subjects.

Courses for Graduates

103. Experiment Station Problems.—Organization and administration of research; objects, methods, and the sources of error in experimental work. Open

to graduate students in all the departments of the College of Agriculture. *Once a week; second semester. One-half unit.* Professor MUMFORD

110. **Animal Nutrition.**—Biochemistry, digestion, metabolism, and nutritive value of proteins. *Twice a week; both semesters. One-half unit.*
Professor GRINDLEY

112. **Research.**—Investigations along the following lines:

(a) Economic factors involved in meat production. Professor RUSK

(b) Systems of livestock farming. Associate Professor CASE

(d) Animal Nutrition. The chemistry of feeding stuffs; metabolism experiments and biochemical studies connected with the nutrition of farm animals. Professor MITCHELL

(e) Animal breeding. Individual research course.
Associate Professor ROBERTS

(f) Problems in poultry husbandry. Professor CARD

One to three times a week; both semesters. One-half to two units. These courses may be taken during the summer by special permission.

117. **Animal Breeding.**—*Two to three times a week; both semesters. One unit.* Associate Professor ROBERTS

118. **Animal Nutrition Seminar.**—A review of current literature in animal nutrition. *Two hours a week; both semesters. One-half unit.*
Professor MITCHELL

119. **Laboratory Methods in Animal Nutrition.**—*Two to five times a week; both semesters. One-half to one unit.* Professor MITCHELL

120. **Laboratory Methods in the Diagnosis of Animal Diseases.**—*Two to five times a week; both semesters. One-half to one unit.* Professor GRAHAM

121. **Laboratory Methods in Animal Breeding.**—*Two to five times a week; both semesters. One-half to one unit.* Associate Professor ROBERTS

Courses for Graduates and Advanced Undergraduates

7. **Principles of Animal Nutrition.**—*Five times a week; first semester.*
Professor MITCHELL

10. **Meat.**—*Three times a week; second semester.*
Associate Professor BULL

22. **Advanced Stock Judging.**—*Five times a week; first semester.*
Members of the department

24. **Meat.**—*Once a week; first semester.* Associate Professor BULL

26. **Pork Production.**—*Three times a week; first semester.*
Professor CARROLL

27. Sheep Husbandry.—*Twice a week; second semester.*
Assistant Professor KAMMLADE

28. History of Breeds of Live Stock.—*Three times a week; second semester.*
Professor EDMONDS and other members of department

29. Systems of Live Stock Farming.—*Twice a week; second semester.*
Associate Professor CASE

31. Advanced Course in Animal Nutrition.—*Three times a week; second semester.* Professor MITCHELL

32. Marketing Live Stock.—The class will visit a terminal live stock market; estimated cost of the trip, $12. *Twice a week; second semester.*
Assistant Professor ASHBY

39. Poultry Production.—*Three times a week; second semester.*
Professor CARD

40. Economics of Poultry Keeping.—*Three times a week; first semester.*
Professor CARD

41. Animal Breeding.—*Three times a week; second semester.*
Associate Professor ROBERTS

ARCHITECTURE AND ARCHITECTURAL ENGINEERING

The prerequisite for graduate work in architecture and architectural engineering is the equivalent of the undergraduate courses required at the University of Illinois for the degree of Bachelor of Science in architecture and architectural engineering in the branches of the subjects in which registration is desired.

Courses for Graduates

101. Architectural Construction.—*Twice a week; both semesters. One-half to one unit.* Professor PROVINE

103. Advanced Architectural Graphics.—*Twice a week; both semesters. One to two units.* Professor PROVINE, Associate Professor PALMER

104. Architectural Design.—*Twice a week; both semesters. One to four units.* Professor DILLENBACK

105. Architectural Practice.—*Twice a week; first semester. One-fourth to one-half unit.* Professor PROVINE

106. Architectural History.—Special research. *Twice a week; both semesters. Time to be arranged. One-half to two units.* Professor NEWCOMB

ASTRONOMY

The prerequisites for graduate study in astronomy are mathematics through calculus, a year's course in observational astronomy, and a course in college physics.

Courses for Graduates

101. Seminar.—*Three times a week; both semesters. One unit.*
Professor BAKER

102. Stellar Astronomy.—*Three times a week; both semesters. One unit.*
Professor BAKER

Courses for Graduates and Advanced Undergraduates

7. Celestial Mechanics.—*Three times a week; second semester.*
Professor BAKER

9. Astrophysics.—*Three times a week; first semester.* Professor BAKER

14. Observational Astronomy.—*Three times a week; both semesters.*
Professor BAKER

15. Geodetic Astronomy.—*Three times a week; second semester.*
Professor BAKER

BACTERIOLOGY

Students electing bacteriology as a major study must have had at least 10 semester hours of bacteriology and 15 semester hours of some other physical or biological science. Before receiving a degree a student must have had work equivalent to courses 5a, 5b, or 20, 8, 26, 103, and 107; candidates for the doctor's degree will be held responsible for a general knowledge of the subject as applied to plant pathology, dairy husbandry (dairy bacteriology), and soil biology. Courses in these subjects are listed under their respective departments and will be counted, after conference with adviser, toward the requirements for the doctor's degree.

Candidates for the doctor's degree with a major study in some other field than bacteriology, who elect a first or second minor in bacteriology, must offer a minimum of three units for the first minor and two and one-half units for the second minor selected from the courses offered in this department, or, for satisfactory reasons, certain courses in the departments mentioned above. Some of these courses must be strictly graduate courses. Course 103 is required of candidates for the doctor's degree whether bacteriology is a major or minor study.

Courses for Graduates

103. Physiology of Bacteria.—*Twice a week; first semester. One unit.*
Professor TANNER

107. Research.—For those students who are taking a major in bacteriology either for the doctor's degree or master's degree. *Both semesters. One-half to four units.* Professor TANNER and Assistant Professor KOSER

118a-118b. Current Literature.—Required of all students majoring in general or pathological bacteriology. *Once a week; both semesters. One-fourth unit.*
Professor TANNER

The attention of students is called also to courses in bacteriology offered in other departments. Certain of these courses must be elected toward requirements for advanced degrees after conference with adviser.

Courses for Graduates and Advanced Undergraduates

8. Applied Bacteriology.—Water, sewage, and food bacteria. *Five times a week; second semester.* Professor TANNER and Mr. WALLACE

10. Epidemiology.—*Twice a week; first semester.*
Assistant Professor KOSER

20. General Bacteriology.—For seniors and graduate students. *Five times a week; both semesters.* Professor TANNER and Assistant Professor KOSER

26. Pathological Bacteriology.—*Three times a week; first semester.*
Professor TANNER and Mr. WALLACE

BOTANY

Candidates for advanced degrees in Botany must offer for admission at least 20 hours in botany, or 15 hours in botany and 5 hours in a related subject acceptable to the department. Graduate students who desire to elect botany for minor credit must offer 15 hours of botany or 10 hours of botany and 5 hours in a related subject acceptable to the department.

The department wishes to call the attention of graduate students to courses in agronomy and soils, bacteriology, chemistry, entomology, geography, geology, horticulture, mathematics, physics, physiology and zoology which are available to advanced students and offer a broad foundation for the different phases of botanical work. The practical work in plant sciences in the College of Agriculture and the Experiment station offers unusual facilities to the graduate student. Joint majors may be arranged in botany and agronomy.

Courses for Graduates

110. Botanical Discussions.—Required of all students and of members of the instructional staff. *Once a week; both semesters.* No credit.

113. Discussions in Physiology.—*Once a week; both semesters. One-fourth unit.* Professor HOTTES

115. Discussions in Vegetation and Environment, and Plant Geography.—*Once a week; both semesters. One-fourth unit.* Professor ————

116. Discussions in Taxonomy of Cormophytes.—*Once a week; both semesters. One-fourth unit.* Professor ————

117. Discussions in Pathology and Mycology.—*Once a week; both semesters. One-fourth unit.* Professor STEVENS

118. Discussions in Ecology.—*Once a week; both semesters. One-fourth unit.* Assistant Professor MCDOUGALL

Research Courses

130. Physiology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 113 to be taken concurrently.) Professor HOTTES

150. Vegetation and Environment.—*Once or twice a week; both semesters. One-half to two units.* (Botany 115 to be taken concurrently.)
Professor ————

155. Plant Geography.—*Once or twice a week; both semesters. One-half to two units.* (Botany 115 to be taken concurrently.) Professor ————

160. Taxonomy of Cormophytes.—*Once or twice a week; both semesters. One-half to two units.* (Botany 116 to be taken concurrently.)
Professor ————

170. Pathology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor STEVENS

177. Mycology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor STEVENS

180. Ecology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 118 to be taken concurrently.) Assistant Professor MCDOUGALL

Courses for Graduates and Advanced Undergraduates

30. Physiology.—Discussions and experiments on growth, and the effect of environment on growth. *Once or twice a week; first semester.*
Professor HOTTES and assistant

33. Physiology.—Discussions and experiments on respiration, and the effects of the environment and food on energy release. *Once or twice a week; first semester.* Professor HOTTES and assistant

40. Algae.—Morphology and classification.—*Once or twice a week; second semester.* (Given in 1928-29 and in alternate years.) Dr. HAGUE

41. Bryophytes.—Morphology and classification.—*Once or twice a week; first semester.* (Given in 1928-29 and in alternate years.) Dr. HAGUE

42. Fungi.—General morphology and taxonomy.—*Once or twice a week; second semester.* Professor STEVENS

43. Pteridophytes.—Comparative morphology.—*Once or twice a week; first semester.* (Given in 1929-30 and in alternate years.) Dr. HAGUE

44. Spermatophytes.—Comparative morphology.—*Once or twice a week; second semester.* (Given in 1929-30 and in alternate years.) Dr. HAGUE

45. Cytology and Anatomy.—The structure and function of the cell and its organs, plant anatomy and histology. *Once or twice a week; second semester.* (Given in 1928-29 and in alternate years.) Professor HOTTES and Dr. SMITH

46. Heredity and Evolution.—The cell in inheritance; environment, adaptation, and evolution. *Once or twice a week; first semester.* (Given in 1929-30 and in alternate years.) Professor HOTTES and assistant

50. Vegetation and Environment.—Classification and recognition of plant communities. Methods of measuring the factors of the habitat and the response of vegetation to direct and indirect factors. *Once or twice a week; first semester.*
Professor ————

55. Plant Geography.—A general survey of world vegetation. The correlation of the major plant communities with climatic conditions, soil conditions, natural production, agricultural production and crop potentiality. *Once or twice a week; second semester.* Professor ————

60. Systematic Botany.—Phylogenetic study of ferns and flowering plants. Relationship of the principal orders and families, rules of taxonomy and the identification of species. *Once or twice a week; second semester.*
Professor ————

70. Taxonomy of Pathogenic Fungi.—Myxomycetes, Bacteria, Phycomycetes and Ascomycetes. *Once or twice a week; first semester.* Professor STEVENS

77. Taxonomy of Pathogenic Fungi.—Basidiomycetes and Fungi Imperfecti. *Once or twice a week; second semester.* Professor STEVENS

78. Morbid Histology.—Studies in the mode of entrance of the pathogen and of the histological changes induced. *Once or twice a week; first semester.* (Given in 1929-30 and alternate years.) Professor STEVENS

79. Methods in Pathology.—A general survey of the special methods used in Plant Pathology. *Once a week; second semester.* (Given in 1928-29 and alternate years.) Professor STEVENS

80. Ecology.—Symbiosis; the interrelationship of plants and the living environment. *Once or twice a week; first semester.*
Assistant Professor MCDOUGALL

88. Ecology.—Plant Communities; the structure and development of the local plant associations. *Once or twice a week; second semester.*
Assistant Professor MCDOUGALL

BUSINESS LAW

Courses for Graduates and Advanced Undergraduates

10. Law of Security Relations and Banking.—*Three times a week; either semester.* Dr. DILLAVOU

BUSINESS ORGANIZATION AND OPERATION

Work may be done in the field of business organization and operation for a major or a minor for the M.S. degree, and for a minor for the doctorate. To do major work in this field, the student must have completed an undergraduate curriculum equivalent to that of the college of commerce and business administration. To do minor work, he must have had at least five semester hours' credit in the principles of economics, also Business Organization and Operation 1 and 2 or the equivalent; Business Organization and Operation 4 is a prerequisite for 104.

Courses for Graduates

102. Marketing Policies and Problems.—*Twice a week; both semesters. One unit.* Associate Professor CONVERSE

104. Scientific Management.—The history of the scientific management movement; critical study of the proposed systems. *Twice a week; both semesters. One unit.* Associate Professor ANDERSON

107. Sales Campaigns.—*Twice a week; both semesters. One unit.* Professor RUSSELL

129. Thesis.—*Time to be arranged; both semesters. One unit.* Professor RUSSELL

Courses for Graduates and Advanced Undergraduates

3. Retail and Wholesale Store Organization and Operation.—*Three times a week; first semester.* Mr. BEHRENS

4. Management in Manufacturing.—*Three times a week; either semester.* Associate Professor ANDERSON

8. Advertising.—*Three times a week; either semester.* Professor RUSSELL, Assistant Professor FERNALD

9. Trade and Civic Organizations.—*Twice a week; second semester.* Dean THOMPSON

14. Problems in Industrial Management.—*Three times a week; either semester.* Professor ————

17. Sales Management.—*Twice a week; second semester.* Professor RUSSELL

18. Advertising Campaigns.—*Twice a week; second semester.* Assistant Professor FERNALD

20. Credits and Collections.—*Twice a week; second semester.* Associate Professor CONVERSE

70. Operation of Public Utilities.—*Three times a week; second semester.* Mr. ORLAND

75. Management of Public Utilities.—*Three times a week; first semester.* Dr. GRAY

CERAMIC ENGINEERING

Graduate work leading to the degrees of Master of Science and Doctor of Philosophy in chemistry (ceramic chemistry), and Master of Science and Doctor of Philosophy in ceramic engineering, are offered by the department. Graduate students who wish to elect ceramic chemistry as their major field of study must have had the equivalent of twenty-five semester hours of chemistry and this must include satisfactory courses in general chemistry, qualitative and quantitative analysis, and either physical or organic chemistry. Such students must

also have had at least one year of college physics and training in mathematics which includes calculus.

The prerequisites for graduate work in ceramics or ceramic engineering are the equivalents of the undergraduate courses required for the degrees of Bachelor of Science in ceramics or ceramic engineering according to the branch of the subject in which registration is desired.

Candidates for the degree of Doctor of Philosophy with their major field of study in ceramic chemistry must fulfill the same general requirements in chemistry as candidates in other branches of chemistry. Before receiving the degree of Doctor of Philosophy in ceramic chemistry and in engineering, all candidates must demonstrate their ability to read French and German literature in their major subject.

Courses for Graduates

101. The Chemistry of the Compounds of Silicon.—*Twice a week; both semesters. One unit.* Professor PARMELEE

102. General Technology of the Clay Industries.—*Both semesters. One to two units.* Professor PARMELEE

103. Silicon Chemistry.—Laboratory to supplement Ceramic Engineering 101, which must precede or accompany it. *Second semester. One to two units.* Professor PARMELEE

104. Technology of Glass.—*Second semester. One to two units.* Professor PARMELEE

105. Methods of Ceramic Research.—*Once a week; second semester. One unit.* Dr. WESTMAN

Courses for Graduates and Advanced Undergraduates

5. Ceramic Bodies.—*Five times a week; first semester.* Professor PARMELEE

7. Heavy Clay Products.—*Three times a week; first semester.* Mr. MCVAY

8. Glass Technology.—*Twice a week; second semester.* Professor PARMELEE

10. Cements.—*Three times a week; second semester.* Mr. MCVAY

11. Drying Clay Products.—*Three times a week; second semester.* Professor HURSH

14. Glasses and Glazes.—*Three times a week; second semester.* Professor PARMELEE

16. Enamels.—*Three times a week; first semester.* Professor PARMELEE

18. Ceramic Microscopy.—*Three times a week; first semester.* Mr. MCVAY

20. Refractory Materials.—*Twice a week; second semester.* Professor HURSH

22. Kilns and the Burning of Clay Products.—*Three times a week; first semester.* Professor HURSH

23. Dryer and Kiln Design.—*Twice a week; first semester.* Professor HURSH

24. Ceramic Engineering Design.—*Three times a week; second semester.* Professor HURSH

28. Pyrochemical Problems.—*Twice a week; second semester.* Professor ANDREWS

CHEMISTRY

Graduate students whose major subject is in some department other than chemistry, before taking graduate work for credit in this department, must have had the equivalent of 15 university credits in chemistry, and the ground covered should include satisfactory work in general chemistry and in qualitative and quantitative analysis and elementary organic chemistry. Such students are advised to make selections from the following courses: Chemistry 40, 41, 42b, 43b, 27b, 28b, 18b, 36b and 37b, 50a, 15a, 16a and 97b. Courses of a more special nature will not as a rule be accepted for graduate work unless preceded by one of the courses above. Graduate students who are candidates for an advanced degree in chemistry must have had the equivalent of 25 university credits in chemistry properly distributed.

Graduate students whose major subject is in some department other than chemistry and who intend to take a first minor in chemistry or any branch of chemistry toward the Ph.D. degree must include among the courses taken, Chemistry 40 and 41, or must have had the equivalent.

Graduate students who are candidates for the M.A. or M.S. degree in chemistry must include in the courses taken, Chemistry 40 and 41 or must have had the equivalent. Graduate students who are candidates for the Ph.D. degree in any branch of chemistry must include among their courses, Chemistry 40, 41, 42b and 43b or must have had the equivalent.

Courses for Graduates

INORGANIC CHEMISTRY AND QUALITATIVE ANALYSIS

101a-101b. Inorganic Chemistry.—The less familiar elements and their relationship in the periodic system. Lectures; recitations. *Twice a week; both semesters. One-half unit.* Professor HOPKINS

102a-102b. Inorganic Chemistry.—(Laboratory). Inorganic preparations and qualitative analysis of the less familiar elements. To accompany or follow Chemistry 101a-101b. *One to three times a week; both semesters. One-fourth to three-fourths unit.*

Professor HOPKINS, Assistant Professor KREMERS, Dr. YNTEMA

N105a-N105b. Inorganic Chemistry.—(Seminar and Special Topics). Current literature; special topic for the first semester 1928-29: *Photochemistry* (Dr. VILLARS). *Three times a week; both semesters. One-fourth to one unit.*

Professor HOPKINS

QUANTITATIVE CHEMISTRY

124a. Quantitative Analysis.—Lectures, with or without laboratory. *Two to five times a week; first semester. One-half to one and one-fourth units.*
Associate Professor CLARK, Assistant Professor ENGLIS

125a-125b. Quantitative Analysis.—(Seminar). Special topics in analytical chemistry. (Required of all students taking a major or minor in analytical chemistry). *One to three times a week; both semesters. One-fourth to one unit.*
Associate Professor CLARK

126a-126b. Quantitative Analysis.—(Quantitative organic chemistry). Toxicology. Lectures; seminar. May be accompanied by laboratory work on a selected group of compounds. *Two to five times a week; both semesters. One-half to one and one-fourth units with laboratory.* Assistant Professor ENGLIS

127a-127b. Modern Applications of Radiation and Other Physical Methods in Chemical and Industrial Problems.—(X-rays, optical spectroscopy, spectrophotometry, polarimetry, refractometry, ultraviolet microscopy, light scattering, etc.) *Twice a week; both semesters. One-half to one unit.*
Associate Professor CLARK

ORGANIC CHEMISTRY

132a. Organic Chemistry.—(First course). Review of the general reactions in organic chemistry: Problems. *Twice a week; first semester. Three-fourths unit.*
Professor ADAMS

133b. Organic Chemistry.—Geometric isomerism; tautomerism; mechanisms of important reactions; etc. *Twice a week; second semester. Three-fourths unit.*
Professor ADAMS

134. Organic Chemistry.—(Laboratory). Advanced preparation is selected to meet the needs of each individual in the course. *Two to four times a week; both semesters. One-half to one unit.* Associate Professor MARVEL, Dr. FUSON

135a-135b. Organic Chemistry.—(Seminar). Current literature. (Required of all students majoring in organic chemistry). *Once a week; both semesters. One-fourth unit.*
Professor ADAMS

136a. Organic Chemistry.—Special topics. *Twice a week; first semester. Three-fourths unit.*
Associate Professor MARVEL

PHYSICAL CHEMISTRY

145a-145b. Physical Chemistry.—(Seminar). Recent development in physical chemistry. *Twice a week; both semesters. Three-fourths unit.*
Professor RODEBUSH and staff

PHYSIOLOGICAL CHEMISTRY

150b. Physiological Chemistry.—Chemistry of intermediary metabolism. Lectures; discussions; readings. *Twice a week; second semester. Three-fourths unit.*
Professor ROSE

152b. Physiological Chemistry.—Difficult biochemical preparations; analytical methods; chiefly laboratory. *One to five times a week; second semester. One-half to one unit.* Professor Rose

155a-155b. Physiological Chemistry.—(Seminar). Current literature. (Required of all students majoring in physiological chemistry). *Twice a week; both semesters. Three-fourths unit.* Professor Rose

INDUSTRIAL CHEMISTRY

160a-160b. Chemical Technology, Chemical Engineering and Plant Design.—Recent developments in the chemical industry. Lectures; laboratory. *Three times a week; both semesters. One unit.*
Professor Keyes, Assistant Professors Layng, Krase

163a-163b. Fuels and Their Combustion.—Special studies of the origin, composition, carbonization, and gasification of coal; carbonization equipment; application and design of combustion equipment. *Twice a week; both semesters. One-half unit.* Assistant Professor Layng

SANITARY CHEMISTRY

186a-186b. Sanitary Chemistry.—Special problems and new developments in sanitary chemistry. *Twice a week; both semesters. One-half to one and one-fourth units.* Professor Buswell

MISCELLANEOUS

190a-190b. Research.—A thesis is usually required of students taking the Master's degree and is always required of students taking the degree of Doctor of Philosophy. *Both semesters.* Work may be taken in the following subjects:

Physical and Electrochemistry—Professor Rodebush, Associate Professor Clark, Assistant Professors Reedy, Phipps

Inorganic Chemistry—Professor Hopkins, Assistant Professors Reedy, Kremers, Yntema.

Analytical Chemistry—Associate Professor Clark, Dr. Smith

X-ray Chemistry—Associate Professor Clark

Food Chemistry—Assistant Professor Englis

Organic Chemistry—Professor Adams, Associate Professor Marvel, Assistant Professor Shriner, Dr. Fuson

Sanitary Chemistry—Professor Buswell

Physiological Chemistry—Professor Rose

Industrial Chemistry—Professor Keyes, Assistant Professors Layng, Krase

Ceramic Chemistry—Professor Parmelee

Phyto-Chemistry—Assistant Professor Englis

Animal Chemistry (Nutrition)—Professor Grindley

Courses for Advanced Undergraduates and Graduates

INORGANIC CHEMISTRY AND QUALITATIVE ANALYSIS

15a. Inorganic Chemistry.—The common elements; periodic relationship; preparation and application of the common elements and compounds. Lectures; recitations. *Twice a week; first semester.* Assistant Professor KREMERS

16a. Inorganic Chemistry.—(Laboratory). Preparation of the less easily produced inorganic compounds. *Twice a week; first semester.*
Assistant Professor KREMERS and assistants

18b. Qualitative Analysis.—Methods of separation; qualitative reagents; theory of reactions. For those intending to teach analytical chemistry. Lectures; seminar. *Twice a week; second semester.* Assistant Professor REEDY

QUANTITATIVE CHEMISTRY

27b. Quantitative Analysis.—Gas analysis, electrometric titration, organic combustions, and other advanced analyses. *Four times a week; second semester.*
Dr. SMITH, Dr. ELDER

28b. Analytical Chemistry.—(Second course). Quantitative methods of analytical chemistry. Analysis of ores and alloys. Stoichiometry. *Six times a week; second semester.* Dr. SMITH

ORGANIC CHEMISTRY

36b. Organic Chemistry.—(Second course). *Three times a week; second semester.* Associate Professor MARVEL

37b. Organic Chemistry.—(Laboratory). (Second course). Organic synthesis. To accompany 36b. *Twice a week; second semester.* Dr. FUSON

38a. Qualitative Organic Analysis.—Identification of pure organic compounds and mixtures. *Twice a week; first semester.* Assistant Professor SHRINER

PHYSICAL CHEMISTRY

40. Elementary Physical Chemistry.—*Three times a week; both semesters.*
Professor RODEBUSH, Assistant Professor PHIPPS

41. Elementary Physical Chemistry.—(Laboratory). To accompany Chemistry 40. *Once a week; both semesters.*
Professor RODEBUSH, Assistant Professor PHIPPS and assistants

42b. Elementary Physical Chemistry.—*Three times a week; second semester.*
Professor RODEBUSH, Assistant Professor PHIPPS

43b. Elementary Physical Chemistry.—(Laboratory). *Once a week; second semester.* Professor RODEBUSH, Assistant Professor PHIPPS and assistants

44a-44b. Physical Chemistry.—Thermodynamics and free energy calculations. Atomic structure. *Twice a week; both semesters.*
Professor RODEBUSH, Assistant Professor PHIPPS

49a. Chemistry of Colloids.—(Sanitary Division). Preparation and properties of colloids. Special apparatus and technique employed in colloid chemistry. *Twice a week; first semester.* Professor BUSWELL, Mr. ELDER

PHYSIOLOGICAL CHEMISTRY

50a. Physiological Chemistry.—Proteins, fats, and carbohydrates; tissues, digestion, intestinal putrefaction, and feces; quantitative analysis of gastric contents, blood, milk, and urine. Lectures; laboratory. *Five times a week; first semester.* Professor ROSE, Dr. COX, and assistants

51b. Problems of Metabolism.—Micro-methods of blood and urine analysis, and their application. Lectures; laboratory. *Three times a week; second semester.* Professor ROSE, Dr. COX, and assistants

INDUSTRIAL CHEMISTRY

60a-60b. Chemical Technology.—The survey of important processes and recent developments in the chemical industry; inspection trip. (Estimated cost of this trip is $30-35 per student). Laboratory. *Four times a week; both semesters.* Assistant Professor LAYNG and Mr. HOWARD

61a-61b. Principles of Chemical Engineering.—The application of scientific principles to the unit operations of chemical engineering. Lectures; laboratory. *Four times a week; both semesters.* Professor KEYES, Assistant Professor KRASE

62a. Principles of Research and Development.—The fundamental methods used in the research and development departments in chemical industry. *Twice a week; first semester.* Professor KEYES

63. Fuels and Their Combustion.—Composition of fuels; principles of combustion; combustion equipment. Lectures; laboratory. *Three times a week; first or second semesters.* Assistant Professor LAYNG

64b. The Flow of Heat.—The mechanism of heat transmission by conduction, convection and radiation; practical problems. *Twice a week; second semester.* Assistant Professor LAYNG

65b. Industrial Stoichiometry.—Graphical representation; problems in chemical engineering; data. *Twice a week; second semester.* (Not given 1928-1929). Assistant Professor LAYNG

67a-67b. Evaporation.—The theory, design and control of commercial evaporative equipment. *Twice a week; both semesters.* (Not given 1928-1929). Assistant Professor KRASE

68a. Mechanical Separation.—Equipment for the mechanical separation of solids, liquids and gases. Theory and calculations. *Twice a week; first semester.* Assistant Professor KRASE

69b. Flow of Gases and Liquids.—Fundamental theory and application. The design of measuring devices and other equipment. *Twice a week; second semester.* Assistant Professor KRASE

70b. Humidification and Drying.—Calculations and mathematical studies of humidifiers and driers. *Twice a week; second semester.* Mr. HOWARD

71a. Sampling, Grinding, and Mixing.—Fundamental principles involved and mathematical calculations. *Once a week; first semester.* (Not given 1928-1929). Mr. HOWARD

72b. Distillation.—Calculations in the operation and design of distillation equipment. *Twice a week; second semester.* (Not given 1928-1929). Mr. HOWARD

73a. Metallurgy.—Manufacture of iron and steel. *Three times a week; first semester.* Mr. HOWARD

74b. Metallurgy and Metallography.—General metallurgy of iron and steel; physical characteristics and microstructure of metals and alloys. Lectures; laboratory. *Three times a week; second semester.* Mr. HOWARD

SANITARY CHEMISTRY

86b. Chemistry of Sanitation.—Lectures, demonstrations, and field trips covering the field of water purification, sewage treatment, and general sanitation. *Three times a week; second semester.* Professor BUSWELL, Mr. ELDER

49a. Chemistry of Colloids.—(See physical division).

MISCELLANEOUS COURSES

92a. Chemical Literature and Reference Work.—*Once a week; first semester.* Miss SPARKS

95a. History of Chemistry.—Lectures; reading. *Twice a week; first semester.* Professor RODEBUSH

97b. Food Analysis.—Quantitative organic analysis of food products; alcohols, carbohydrates, fats and oils, cereals, nitrogenous bodies, preservatives, and colors. *Six times a week; second semester.* Assistant Professor ENGLIS and assistant

CIVIL ENGINEERING

The prerequisite for graduate work in civil engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in civil engineering in the branches of the subject in which registration is desired.[1]

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[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other fields.

Courses for Graduates

101. Water Supply Engineering.—*Twice a week; first semester. One unit.*
Professor BABBITT

102. Sewerage.—*Twice a week; second semester. One unit.*
Professor BABBITT

103. Highway Construction.—*Twice a week; first or second semester. One unit.*
Professor CRANDELL

105. Advanced Reinforced Concrete Theory.—*Once a week; first semester. One-half unit.*
Professor CROSS

106. Reinforced Concrete Structures.—*Twice a week; first semester. One to three units.*
Professor CROSS

107. Statically Indeterminate Structures and Secondary Stresses.—*Twice a week; first semester. One unit.*
Professor WILSON

108. Advanced Bridge Design.—*Twice a week; second semester. One or two units.*
Professor CROSS

109. Water Purification and General Sanitation.—*Twice a week; first semester. One unit.*
Professor BABBITT

110. Sewage Disposal, Wastes Disposal and General Sanitation.—*Twice a week; second semester. One unit.*
Professor BABBITT

112. Foundations.—*Twice a week; first semester. One unit.*
Professor HUNTINGTON

113. Appraisals and Rate Making.—*Twice a week; second semester. One unit.*
Professor ————

124. Steel Building Construction.—*Twice a week; second semester. One or two units.*
Professor HUNTINGTON

125. Advanced Design of Industrial Structures.—*Twice a week; second semester. One unit.*
Dean KETCHUM

130. Advanced Hydrology.—*Twice a week; first or second semester. One unit.*
Associate Professor PICKELS

Courses for Advanced Undergraduates and Graduates[1]

63. Statically Indeterminate Structures.—The elastic theory and its applications in statically indeterminate structures. *Three times a week; first semester.*
Professor CROSS

64. Statically Indeterminate Structures.—A continuation of course 63. *Twice a week; second semester.*
Professor CROSS

[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other fields.

For other graduate work in reinforced concrete, see Mechanics 105.

For graduate work in railway civil engineering, see Railway Civil Engineering 110, by Professor KING.

THE CLASSICS

The Degree of Master of Arts in the Classics.—The major may be either Latin or Greek.

The Degree of Doctor of Philosophy in the Classics.—The degree is given in classical philology. Major work may be taken in either Latin or Greek, but whichever language is taken as a major, the other must be taken as a first minor.

GREEK

Preparation for first-year graduate work in Greek must include at least two years of preparatory Greek, two years of college Greek, and two years of college Latin. A reading knowledge of French and German is important for candidates in this subject. The study of history and philosophy is especially recommended.

Courses for Graduates

105. Plato and Aristotle.—*Twice a week; both semesters. One unit.*
Professor OLDFATHER

106. The Drama.—*Twice a week; first semester. One unit.*
Associate Professor PERRY

110. Bibliography and Criticism.—(Thesis course; the same as Latin 110). *Once a week; both semesters. One unit.*
Professors OLDFATHER, CANTER and others

113. The Greek Romance.—*Twice a week; second semester. One unit.*
Associate Professor PERRY

Courses for Graduates and Advanced Undergraduates

5. Herodotus and Lyric Poets.—Lectures and assignments on the Greek language. *Three times a week; first semester.* Dr. COUCH

7. Greek Drama: Tragedy and Comedy.—Lectures and assignments on the Greek language. *Three times a week; second semester.* Dr. COUCH

LATIN

Preparation for first-year graduate work in Latin must include at least two years of preparatory Latin and four years of college Latin, or three years of preparatory Latin and three years of college Latin. A reading knowledge of French and German is important. Some acquaintance with Greek is highly desirable, and the study of history and philosophy is especially recommended.

Courses for Graduates

102. Roman Oratory.—*Twice a week; first semester. One unit.*
Professor CANTER

109. Vergil.—*Twice a week; second semester. One unit.*
Professor CANTER

110. Bibliography and Criticism.—(Thesis course; the same as Greek 110). *Once a week; both semesters. One unit.*
Professors OLDFATHER, CANTER and others

117. Lucretius.—*Twice a week; first semester. One unit.*
Associate Professor PERRY

118. The Latin Romance.—*Twice a week; second semester.*
Associate Professor PERRY

Courses for Graduates and Advanced Undergraduates

7. Livy (selections); Tibullus and Propertius.—*Three times a week; first semester.* Professor CANTER

8. Ovid (selections); Seneca (Epist. and Trag.).—*Three times a week; second semester.* Professor CANTER

DAIRY HUSBANDRY

Candidates for advanced degrees in dairy husbandry must have had adequate training in collegiate courses dealing with the principles of the subject which the candidate elects as his major.

Candidates registering in dairy husbandry as a major subject must register for one minor in a subject closely related to the major, and this may under certain conditions and with proper approval be a division of the major field of study. However, in such cases, this will constitute a second minor.

It is recommended that at least one minor be selected in a field outside the College of Agriculture.

Students desiring to specialize in plant breeding (or animal breeding) are referred to the Zoology Department for the fundamental courses in Genetics.

Courses for Graduates

101. Economic Milk Production.—*Twice a week; both semesters. One-half to two units.* Professor FRASER

104. Dairy Bacteriology.—Fermentation in dairy products. *Both semesters. One-half to one unit.* Professor PRUCHA

105. Dairy Manufactures.—*Both semesters. One-half to two units.*
Professor RUEHE

106. Dairy Bacteriology.—Research on assigned problems. *Both semesters. One-half to two units.* Professor PRUCHA

107. Dairy Chemistry.—Assigned problems. *Once a week; both semesters. One-half to two units.* Assistant Professor OVERMAN

108. Physiology of Lactation.—*Once a week; both semesters. One-half to two units.* Professor GAINES

112. **Research.**—*Both semesters, one to four units.* Special problems along the following lines:

(a) **Dairy Bacteriology.** Professor PRUCHA

(b) **Dairy Chemistry.** Assistant Professor OVERMAN

(c) **Dairy Cattle Breeding.** Associate Professor YAPP

(d) **Dairy Cattle Feeding.** Assistant Professor NEVENS

(e) **Milk Production.** Professor GAINES

(f) **Dairy Manufactures.** Professor RUEHE

NOTE: Graduate students writing a thesis should so indicate in registering in Dairy Husbandry 112.

Courses for Graduates and Advanced Undergraduates

4. **Ice Cream Making.**—*Three times a week; first semester.*
Assistant Professor TRACY

5. **Composition of Dairy Products.**—*Three times a week; second semester.*
Assistant Professor OVERMAN

7. **Creamery Buttermaking and Factory Management.**—*Five times a week; second semester.* Professor RUEHE

10. **Dairy Bacteriology.**—*Three times a week; first semester.*
Professor PRUCHA, Assistant Professor BRANNON

14. **Milk Condensing.**—*Three times a week; second semester.*
Assistant Professor TRACY

17. **Advanced Study of Dairy Breeds.**—*Three times a week; first semester.*
Associate Professor YAPP

20. **Economic Problems in Dairy Farming.**—*Twice a week; first semester.*
Professor FRASER

21. **Economic Milk Production.**—*Five times a week; second semester.*
Professor FRASER

25. **Advanced Dairy Cattle Feeding.**—*Twice a week; first semester.*
Assistant Professor NEVENS

ECONOMICS

Every student entering on major graduate work in economics must have had a course in the principles of the science and also in some special part of the field such as public finance or money and banking. The work must represent at least eight semester hours. He must have had at least one semester's work in English, American, or general European history; and at least three hours in political science.

Those who take the subject as a minor must have had a course of at least five semester hours in the principles.

Graduate students who are making economics their major are required during their first year to acquaint themselves with the works of the masters in the science, by taking either course 101 or 103. In the same or subsequent year they are expected to elect the fundamental courses in some other divisions of the field of economics, as indicated by the divisions listed in the Economic Seminar, course 118. One of the minors for the doctor's degree may be taken in a separate division of economics; the other must be taken out of the department, and preferably outside of the College of Commerce.

The following courses may be taken by students in general economics for major or minor credit; all numbered above 100; 4, 10, 11, 13, 14, 15, 17, 24, 25, 29, 30, 41, 42, 43, 44, 51, 52, 54, 55, 61, 71, 72, 81. The following may be taken for minor credit only: 8, 9, 31, 36, 56, 82.

Two units will be accepted for a first minor for the master's degree; and four two or three-hour graduate courses, or their equivalent in advanced undergraduate courses, for a first minor for the doctor's degree.

Courses in transportation may be included in their programs by students of Economics as part of their major; courses in transportation, accountancy, and business organization and operation may be used to satisfy the requirements for the minor. See Business Organization and Operation, and Transportation.

Courses for Graduates

101. Economic Theory.—*Three times a week; both semesters. One unit.*
Professor Weston

102. Theory of Money, Credit, and Prices.—*Twice a week; both semesters. One unit.* Professor Weston

103. The Distribution of Wealth.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor Weston

104a. Theories and Policies of Foreign Trade.—*Twice a week; first semester. One unit.* Professor Litman

104b. Organization of Foreign Trade.—*Twice a week; second semester. One unit.* Professor Litman

105. Public Finance.—*Twice a week; both semesters. One unit.*
Associate Professor Hunter

106. International Exchange and the Money Markets.—*Twice a week; second semester. One unit.* Associate Professor Wright

107. The Corporation in Economic Evolution.—*Twice a week; both semesters. One unit.* Professor Robinson

109. Reserve Banking.—*Twice a week; first semester. One unit.*
Associate Professor Wright

110a. Finance and Investments: Fundamental Principles Applied to Business Interests of a Simple Character.—*Twice a week; both semesters. One unit.*
Professor Robinson

110b. Finance and Investments: Complex Business Units.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor ROBINSON

112. Labor Problems.—*Twice a week; both semesters. One unit.* Assistant Professor BERMAN

Arranged in a two-year cycle:

1928-29: *first semester,* Social Aspects of Labor; *second semester,* Trade Unionism.

1929-30: *first semester,* Socialism and Economic Reform; *second semester,* Labor and the Law.

118. Seminar.—Thesis Course. (All graduate students majoring in Economics must register in Economics 118, but only those students who are writing theses will be given credit.)

(a) Third Year: Seminar. Professor WESTON

(b) First Year: General Economics. Assistant Professor BROWN

(c) First Year: Agricultural Economics. Associate Professor STEWART

(d) First Year: Public Utilities. Dean THOMPSON

120. History of Economic Thought.—*Twice a week; both semesters. One unit.* Professor WESTON

122. Economic History of the United States.—*Twice a week; both semesters. One unit.* Professor BOGART

124. International Finance.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor BOGART

130. Theory of Agricultural Economics.—*Twice a week; both semesters. One unit.* Associate Professor STEWART

131. Agricultural Resources and Prices.—*Twice a week; both semesters. One unit.* Assistant Professor NORTON

132. Agricultural Economics Research.—Only those who write acceptable theses will receive credit. *Once a week; both semesters. One to two units.* Associate Professor STEWART

143. The Administration of Industrial Relations.—*Twice a week; both semesters. One unit.* (Not given in 1928-29).

Theory of Statistics.—See Mathematics 129.

144. Statistical Theory and Analysis.—*Twice a week; both semesters. One unit.* Associate Professor WOLFE

180. Management of Public Utilities.—*Twice a week; both semesters. One unit.* Dean THOMPSON

Courses for Graduates and Advanced Undergraduates

4. History of Money and Banking Institutions.—*Three times a week; first semester.* (Not given in 1928-29). Associate Professor WRIGHT

8. Foreign Exchange and the Money Market.—*Three times a week; second semester.* Associate Professor WRIGHT

9. Advanced Theory and Practice of Banking.—*Three times a week; first semester.* Associate Professor WRIGHT

10. Corporation Finance and Management.—*Three times a week; second semester.* Professor ROBINSON

11. Industrial Consolidation.—Development; plans for controlling trusts. *Three times a week; first semester.* Professor ROBINSON

13. Marketing and Prices of Agricultural Products.—*Three times a week; first semester.* Associate Professor STEWART

14. Cooperation in Agriculture.—*Twice a week; second semester.* Assistant Professor NORTON

15. Financing Agriculture.—*Three times a week; second semester.* Assistant Professor NORTON

17. Economic History of Agriculture.—*Twice a week; first semester.* Assistant Professor NORTON

18. Land Economics.—*Three times a week; second semester.* Associate Professor STEWART

24. Economic Development of Modern Europe.—*Three times a week; second semester.* Professor BOGART

25. Economic History of England.—*Three times a week; first semester.* Professor BOGART

29. Foreign Commerce and Commercial Policies.—*Three times a week; second semester.* Professor LITMAN

30. World Markets.—*Three times a week; second semester.* Professor LITMAN

31. Organization of Foreign Commerce.—*Three times a week; first semester.* Professor LITMAN

35. Corporation Finance.—*Three times a week; first semester.* Assistant Professor BROWN

36. Investments.—*Three times a week; second semester.* Professor ROBINSON

41. Introduction to Labor Problems.—*Three times a week; first semester.* Assistant Professor BERMAN

42. Labor Organizations and Employers' Associations.—*Twice a week; second semester.* Assistant Professor BERMAN

43. Personnel Administration.—*Three times a week; second semester.*
Dr. DICKINSON

44. Socialism and Economic Reform.—*Twice a week; first semester.*
Assistant Professor BERMAN

51. Public Finance.—*Three times a week; first semester.*
Associate Professor HUNTER

52. Taxation.—*Three times a week; second semester.*
Associate Professor HUNTER

54. The Fiscal System of Illinois.—*Twice a week; second semester.*
Associate Professor HUNTER

55. Economics of Insurance (Life).—*Three times a week; first semester.*
Associate Professor WOLFE

56. Economics of Insurance (Property).—*Three times a week; second semester.*
Associate Professor WOLFE

61. Economic Theory.—*Twice a week; both semesters.*
Associate Professor HUNTER; Assistant Professor BROWN

71. Economic Statistics.—*Three times a week; first semester.*
Associate Professor WOLFE

72. Economic Statistics. (Business Barometers).—*Three times a week; second semester.*
Associate Professor WOLFE

81 Principles of Public Utilities.—*Three times a week; first semester.*
Assistant Professor GRAY

82. Regulation of Public Utilities.—*Twice a week; both semesters.*
Assistant Professor DILLAVOU

83. Public Utility Rates.—*Three times a week; second semester.*
Assistant Professor GRAY

EDUCATION

Students who elect education as a major subject must have completed at least a three-hour course in the principles of education, a course of at least the same length in the history of education, and a minimum of three hours each in psychology and philosophy. For graduate students who have had experience in teaching these requirements may be modified.

Courses for Graduates

101. Educational Theory.—*Twice a week; one hour; second semester. One unit.*
Professor CAMERON

102. Research in History of American Education.—*Once a week; two hours; both semesters. One unit.* Professor SEYBOLT

104. Educational Administration.—*Twice a week; one hour; both semesters. One unit.* Dean CHADSEY

106. High School Administration.—*Once a week; two hours; first semester. One unit.* Professor CLEMENT

110. Methods of Teaching.—*Once a week; two hours; first semester.* Professor MONROE

119. Curriculum Construction.—*Once a week; two hours; second semester. One unit.* Professor MONROE

120a. Supervision in Secondary Education.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

123. Educational Statistics.—*Once a week; two hours; first semester.* Assistant Professor ODELL

124. Theory of Educational Research.—*Once a week; two hours; first semester. One unit.* Professor MONROE

125. Educational Psychology.—Psychology of school subjects. *Once a week; two hours; both semesters. One unit.* Professor CAMERON

127. High School Curricula.—*Once a week; two hours; both semesters. One unit.* Professor CLEMENT

141. Problems in the Teaching of English in the Secondary School.—*Once a week; two hours; both semesters. One unit.* Professor PAUL

150. Thesis.—*Both semesters. One or two units.* Dean CHADSEY and others

Courses for Graduates and Advanced Undergraduates

4. Problems of Educational Administration.—Interpretation of present tendencies. *Three times a week; first semester.* Dr. WEBER

11. Ancient and Medieval Education.—*Twice a week; first semester.* Professor SEYBOLT

18. Educational Measurements.—*Three times a week; second semester.* Dr. ODELL

20a. Supervision of Secondary Education.—*Twice a week; first semester.* Professor CLEMENT

27. High School Curricula.—*Twice a week; second semester.* Professor CLEMENT

30. History of American Education.—*Twice a week; second semester.* Professor SEYBOLT

41. Vocational Education.—*Three times a week; first semester.* Professor MAYS

42. Special Education.—*Twice a week; first semester.* Professor CAMERON

43. Mental Tests.—*Three times a week; second semester.* Professor CAMERON

44. Educational Psychology.—(Laboratory Course.) *Three times a week; first semester.* Professor CAMERON

49. Principles of Intellectual Development.—*Three times a week; second semester.* Associate Professor GRIFFITH

53. Problems of Industrial Education.—*Three times a week; both semesters.* Professor MAYS

54. Function and Methods of Part-time Teaching.—*Twice a week; first semester.* Professor MAYS

54a. Curriculum Construction in the Part-time Schools.—*Twice a week; second semester.* Professor MAYS

55. Problems of Vocational Guidance.—*Three times a week; second semester.* Professor MAYS

ELECTRICAL ENGINEERING

The prerequisite for graduate work in electrical engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in electrical engineering in the branches of the subject in which registration is desired.

Graduate students who wish to take a minor in electrical engineering must have had differential and integral calculus, and one year's work in college physics.

Courses for Graduates[1]

101. Advanced Course in Alternating Currents.—The theory of transient phenomena; polyphase circuits; measuring apparatus. *Twice a week; both semesters. One and one-half units.* Professor PAINE

103. Electrical Designs.—*Twice a week; second semester. One unit.* Assistant Professor WALDO

105. Electrical Engineering Research.—*Twice a week; both semesters. One to three units.* Professors PAINE, BROOKS

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[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other departments.

ENGLISH LANGUAGE AND LITERATURE

Students who enter on graduate work with English as their major subject are required to give evidence of their ability to write good English. They must present the equivalent of fourteen hours of undergraduate work in English literature, the required college work in rhetoric, and the equivalent of four semesters of college work in Latin, or in Greek, or in French, or in German. After the first year of graduate work a knowledge of French and German is indispensable.

Students making English their minor may be admitted to such courses as in the judgment of the instructor in charge they are qualified to pursue.

The Degree of Master of Arts in English.—In addition to complying with the general rules of the Graduate School, candidates for the degree of Master of Arts in English must comply with the following rules of the Department of English: (1) they must choose a portion of their work from the group of courses described as "for graduates;" (2) must offer an elementary course in Anglo-Saxon; and (3) must take besides the regular semester examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Master of Arts in Public Speaking. Candidates for the degree of Master of Arts in Public Speaking must comply with the following regulations: (1) They must satisfy the general requirements of the Department of English for admission to graduate work; (2) must offer a minor in English of not less than two units selected from 100 courses in English literature; (3) must take, besides the regular semester examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Doctor of Philosophy in English.—Candidates for the degree of Doctor of Philosophy in English may expect to be examined on the entire field of the English language and literature. They are urged, furthermore, to acquaint themselves as fully as possible with the history and philosophy of the period in which their main interest lies, and with the foreign languages and literatures most closely related to English in that period.

Courses for Graduates

101. Research in Special Topics.—*One or two units.*
Professors Bernbaum, Flom, Paul, Zeitlin, T. W. Baldwin; Associate Professors H. S. V. Jones, E. C. Baldwin, Hillebrand, Jefferson; Assistant Professors Rinaker, Bundy, Parry, Secord.

110. Old English (Anglo-Saxon) Poetry.—*Twice a week; first semester.*
Professor Flom

114. The Development of the Essay.—The English Essay; Continental Influences; Classical Origins. *Twice a week; both semesters. One unit.*
Associate Professor Zeitlin

120. History and Principles of Literary Criticism.—*Twice a week; both semesters. One unit.*
Assistant Professor Bundy

129. English Literature from the Norman Conquest to 1400.—*Twice a week; second semester. One unit.* Associate Professor JONES

130. Tragedy.—*Twice a week; both semesters. One unit.* Associate Professor HILLEBRAND

135. Problems in American Literature.—*Twice a week; first semester. One unit.* Professor PAUL

136. The Classical Movement. (c. 1675-1750).—*Twice a week; first semester. One unit.* Assistant Professor SECORD

138. The Romantic Movement.—*Twice a week; both semesters. One unit.* Professor BERNBAUM

140. Investigations in Modern English Literature.—(For second-year and third-year graduate students who are preparing theses for the Doctor's Degree.) *Three hours, once a week; both semesters. One to three units.* (May be taken in successive years.) Professor BERNBAUM

141. Literature of the Seventeenth Century.—*Twice a week; both semesters. One unit.* Associate Professor E. C. BALDWIN

143. The History and Theory of Prose Fiction.—*Two hours once a week; both semesters. One unit.* (May be taken in successive years.) Professor BERNBAUM

147. Shakspeare and Elizabethan Drama.—Critical Study of the Chief Plays. *Twice a week; second semester. One unit.* Professor T. W. BALDWIN

Courses for Graduates and Advanced Undergraduates

A. ENGLISH LANGUAGE AND LITERATURE

3. The Poetry of Milton.—*Three times a week; second semester.* Associate Professor E. C. BALDWIN

4. English Versification.—*Three times a week; first semester.* Assistant Professor LANDIS

5. Shakspeare.—*Three times a week; second semester.* Professor T. W. BALDWIN

8. Old English (Anglo-Saxon).—*Three times a week; first semester.*

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9. Beowulf.—*Three times a week; second semester.* Associate Professor JONES

17. History of the English Language.—*Three times a week; second semester.* Professor FLOM

25. Chaucer.—*Three times a week; first semester.* Associate Professor JONES

26. Spencer.—*Three times a week; first semester.*
Associate Professor JONES

30. Some American Novelists Since 1870.—*Three times a week; second semester.* Dr. TUPPER

35. The English Drama (Previous to Shakspeare).—*Three times a week; first semester.* Professor T. W. BALDWIN

38. The Arthurian Tradition.—*Three times a week; second semester.*
Assistant Professor PARRY

39. Introduction to Medieval Literature.—*Three times a week; first semester.* Assistant Professor PARRY

43. Browning.—*Three times a week; first semester.* Miss KYLE

45. The Development of the Modern Drama.—*Three times a week; first semester.* Associate Professor HILLEBRAND

50. Language and Literature of the First Half of the Seventeenth Century.—*Three times a week; second semester.* Professor ZEITLIN

52. The Great Novelists of the Nineteenth Century.—*Twice a week; first semester.* Professor BERNBAUM

54a. Introduction to Comparative Literature.—*Three times a week; both semesters.*
Professors BERNBAUM, OLDFATHER, FITZ-GERALD, OLIVER, ARON; Assistant Professors VAN HORNE, LANDIS, PERRY, PARRY.

B. RHETORIC

17. Advanced Composition.—*Three times a week; first semester.*
Assistant Professor RINAKER

C. PUBLIC SPEAKING

6. Persuasion and the Forms of Public Address.—*Three times a week; first semester.* _____

7. Masters of Public Address.—*Three times a week; second semester.* _____

8. Dramatization.—*Three times a week; first semester.* _____

D. SCANDINAVIAN LANGUAGES

Preparation for major graduate work in the Scandinavian languages or literature must include a good knowledge of one of the Scandinavian languages and systematic work in the undergraduate courses in Scandinavian. Any graduate student in language may, however, be admitted to the purely philological courses.

Courses for Graduates

101. Old Norse.—Introduction to the language, using Gordon's *Introduction to Old Norse,* supplemented by parts of Noreen's *Altnordische Grammatik I,* (ed. 1923); reading of the *Prose Edda* and selections from the sagas. *Twice a week; both semesters. One unit.* Professor Flom

110. Advanced Old Norse (Old Norse Poetry).—Critical study of the *Poetic Edda. Twice a week; both semesters. One unit.* Professor Flom

130. The Runic Inscriptions (Introduction to Primitive Germanic).—*Twice a week; second semester. One unit.* Professor Flom

150. Research.—Special problems in Scandinavian philology or literature. Conferences. *One-half to two units.* Professor Flom

Courses for Graduates and Advanced Undergraduates

14. History of Old Norse Literature.—Lectures on the mythological and heroic poetry; court poetry; sagas and romances; learned writings. *Twice a week; second semester.* (Not given in 1928-29). Professor Flom

ENTOMOLOGY

The prerequisite for graduate work in entomology is two years of undergraduate biology, including zoology and entomology. Entrance on major work in entomology requires at least six hours of entomology. A reading knowledge of French and German is desirable by the beginning of the second year.

Courses for Graduates

102. Research in the Morphology and Embryology of Insects.—*Once or twice a week; both semesters. One-half to two units.*
Associate Professor Hayes

107. Insect Anatomy.—Lectures and laboratory. *Three times a week; both semesters. One-half unit.* Associate Professor Hayes

108. Research in Economic Entomology.—*Once or twice a week; both semesters. One-half to two units.* *Professor* Metcalf

109. Research in Systematic Entomology.—*Once or twice a week; both semesters. One-half to two units.*
Professor Metcalf, Assistant Professor Balduf

110. Research in the Biology and Ecology of Insects.—*Once or twice a week; both semesters. One-half to two units.* Professor Metcalf

Courses for Graduates and Advanced Undergraduates

6. Special Problems.—*Once or twice a week; both semesters.*
Various Instructors.

10. Taxonomy of Immature Insects.—*Three times a week; both semesters.*
Associate Professor HAYES

20. Insect Control.—*Three times a week; first semester.*
Professor METCALF, Dr. GLASGOW

21. Insect Bionomics.—*Three times a week; second semester.*
Professor METCALF

FARM ORGANIZATION AND MANAGEMENT

Graduate work in Farm Organization and Management leading to a degree of Master of Science is open to students who have had a thoro training in the fundamental principles of the subject, either in connection with, or in addition to a course of study in agriculture substantially equivalent to that offered in this University. Such students must have had at least 8 hours of Economics.

In order to qualify for a master's degree in Farm Organization and Management, a student must take at least 2 units of work in Economics courses, either as part of his major, or as his first minor. Also, the student must take not less than three units of work from 100 courses in Farm Organization and Management.

Courses for Graduates

101. Farm Organization and Management.—A study of principles, including an historical study of the contributions to the farm management field. *Twice a week; both semesters. One unit.* Associate Professor CASE

110. Farm Organization and Management Research.—Only those who write acceptable theses will receive credit. *Once a week; both semesters. One to two units.* Associate Professor CASE

130. Theory of Agricultural Economics.—(The same as Economics 130). *Twice a week; both semesters. One unit.* Associate Professor STEWART

131. Agricultural Resources and Prices.—(The same as Economics 131). *Twice a week; both semesters. One unit.* Assistant Professor NORTON

Courses for Graduates and Advanced Undergraduates

4. Farm Operation.—*Twice a week; first semester.* Mr. ROSS

5. Farm Organization.—*Three times a week; second semester.*
Associate Professor CASE

6. Land Tenure.—*Twice a week; first semester.* Associate Professor CASE

29. Systems of Live Stock Farming.—(The same as Animal Husbandry 29). *Twice a week; second semester.* Assistant Professor WILCOX

13. Marketing and Prices of Agricultural Products.—(The same as Economics 13). *Three times a week; both semesters.* Associate Professor STEWART

14. Cooperation in Agriculture.—(The same as Economics 14). *Twice a week; second semester.* Assistant Professor NORTON

18. Land Economics.—(The same as Economics 18). *Three times a week; first semester.* Associate Professor STEWART

GENETICS

(See Zoology)

GEOLOGY

For graduate work in geology the student must have had at least a major in geology and an acceptable field training. Other graduate students with adequate technical preparation may be admitted to certain graduate courses.

Under the present organization of the Department, the major field of study for the doctorate will be general geology. First and second minor subjects are available as follows: (a) historical geology, including stratigraphy and paleontology; (b) economic geology; (c) mineralogy and petrology; (d) physiography, including glaciology; (e) structural and metamorphic geology; (f) crystallography; (g) sedimentation; pedology.

A first minor presupposes 4 units, and a second minor 2 units credit.

Courses for Graduates

101. Advanced Crystallography.—*Twice a week; both semesters. One unit.* Professor BAYLEY

102. Igneous Petrography.—Lectures; laboratory. *Twice a week; first semester. One unit.* Professor BAYLEY

103. Metamorphic Petrography.—Lectures; laboratory. *Twice a week; second semester. One unit.* (Not given in 1928-29). Professor BAYLEY

104. Pre-Cambrian Stratigraphy.—*Twice a week; second semester. One unit.* Professor QUIRKE

108. Ore Deposition.—Problems in the origin of ore deposits, as illustrated by selected mining districts. *Three times a week; both semesters. One unit.* Professor BAYLEY

125. Sedimentation.—The interpretation of sedimentary rocks in terms of their origin. *Three times a week; first semester. One unit.* Assistant Professor BEVAN

135. Research.—*Once a week; both semesters. One-half to four units.* Professors BAYLEY, SAVAGE, and QUIRKE; Associate Professor BLANCHARD, and Assistant Professors BEVAN and APPLETON, and Dr. HOWARD

136. Seminar.—Special studies in Mineralogy, Petrology, Ore deposits, Metamorphism, Structural geology, Pre-Cambrian geology, Paleontology, Stratigraphy, Petroleum geology, Sedimentation, Physiography, Glacial geology, Eco-

nomic geography, and in Regional geography of Illinois. *Once a week; both semesters. One-half or one unit.*

Professors Bayley, Savage, and Quirke; Associate Professor Blanchard, and Assistant Professors Bevan and Appleton, and Dr. Howard

142. Stratigraphic Paleontology.—The invertebrate index fossils of the successive geologic formations. *Twice a week; both semesters. One unit.*

Professor Savage

151. Advanced Dynamic Geology.—A critical analysis of geologic processes and their results; the materials and structure of the earth; problems of geologic interpretations. *Three times a week; first semester. One unit.*

Professor Quirke

152. Advanced Historical Geology.—Cosmogeny; the record of diastrophism; the development of the continents and oceans; the relationship between oceanic fluctuations and organic differentiation and evolution; physiographic, climatic, and organic history. *Three times a week; second semester. One unit.*

Assistant Professor Bevan

160. Petroleum Geology.—*Twice a week; both semesters. One unit.*

Dr. Howard

Courses for Graduates and Advanced Undergraduates

A. GEOLOGY

7. Optical Mineralogy.—*Five times a week; second semester.*

Professor Bayley

9. Invertebrate Paleontology.—*Three times a week; first semester.*

Professor Savage

15. Structural Geology.—Rock deformation and its results. *Three times a week; first semester.* Dr. Shepard

16. Stratigraphy.—Fossil faunas, with special reference to Paleozoic invertebrates. *Three times a week; second semester.* Professor Savage

38. Regional Geology of North America.—The characteristics of individual geology provinces. Recitations. *Three times a week; second semester.*

Assistant Professor Bevan

47. Systematic Mineralogy.—*Three times a week; first semester.*

Professor Bayley

48. Silicate Minerals and Rocks.—*Five times a week; second semester.*

Professor Bayley

49. Microscopic Mineralogy.—*Five times a week; second semester.*

Dr. Howard

95. Economic Geology.—The nature, occurrence, origin, and uses of coal, oil, building stones, and bedded deposits of economic importance. *Three times a week; first semester.* Professor Bayley

96. Economic Geology.—The nature, occurrence, and origin of metaliferous deposits. Theories of ore deposition. *Three times a week; second semester.*
Professor BAYLEY

B. GEOGRAPHY

5. Geography of South America.—*Three times a week; first semester.*
Associate Professor BLANCHARD

8. Geography of Europe.—*Three times a week; second semester.*
Associate Professor BLANCHARD

12. Geographic Factors in the History of the United States.—*Three times a week; second semester.* Assistant Professor APPLETON

53a-53b. Advanced Industrial and Commercial Geography.—*Three times a week; both semesters.* Associate Professor BLANCHARD

GERMAN

Germanic Languages and Literature

Students desiring to take German as a major are required to have finished successfully a four-year course of undergraduate work in German, or its equivalent. They are also required to be familiar with the principal works of the writers of the classical and modern periods of German literature, to show a general knowledge of the history of German literature, and to be able to follow lectures in the German language.

Of collateral subjects, a reading knowledge of French is important and is required for advanced graduate work. Some acquaintance with Latin and with German history is highly desirable.

Courses for Graduates

101. Seminar.—*Twice a week; both semesters. One unit.* Professor ARON

103. Introduction to the Historical Study of the Germanic Languages.—History of German philology; comparative grammar of the old Germanic dialects. *Twice a week; first semester. One unit.*
Associate Professor WILLIAMS

105. Old High German.—Grammar and interpretation of the oldest literary documents. *Twice a week; second semester. One unit.*
Associate Professor WILLIAMS

109. Goethe and Schiller.—*Twice a week; second semester. One unit.*
Professor BROOKS

110. Early German Drama.—German drama up to the Reformation. *Twice a week; first semester. One unit.* Professor BROOKS

113. German Literature of the Fifteenth and Sixteenth Centuries.—*Twice a week; first semester. One unit.* Professor BROOKS

121. Walther von der Vogelweide.—*Twice a week; second semester. One unit.* Associate Professor WILLIAMS

126. Herder and His Relation to European Literature.—*Twice a week; both semesters. One unit.* Assistant Professor KOLLER

Courses for Graduates and Advanced Undergraduates

19a-19b. Goethe's Faust.—The Faust legend and early Faust books and plays; the genesis of Goethe's *Faust;* reading of both parts. *Twice a week; both semesters.* Professor BROOKS

26a. German Literature up to 1800.—*Three times a week; first semester.* Professor ARON

26b. German Literature since 1800.—*Three times a week; second semester.* Professor ARON

31. Middle High German.—*Twice a week; first semester.* Associate Professor WILLIAMS

GREEK
(See Classics)

HISTORY

Graduate work in history requires two years of college work in this subject, or sixteen semester hours, which should ordinarily include introductory courses in European and American history. Linguistic preparation is important, especially in French and German. For medieval history some knowledge of Latin is essential, and Spanish is useful for certain fields of American history.

Advanced courses in history at the University of Illinois are of three kinds: (1) Courses for information and guidance in general reading. (2) Instruction in methodology, historiography, and bibliography. A part of this work (in course 103) is required of all graduate students in history during their first year. (3) Seminary courses for the study of special fields with a view primarily to training in the methods of historical criticism and research.

Illinois Historical Survey.—Students of history have an opportunity to pursue research in western history in connection with the Illinois Historical Survey, which is an organization for the purpose of carrying on systematic studies in the history of Illinois.

Attention is also called to the fact that the University of Illinois has for some time cooperated with the Trustees of the State Historical Library in the gathering and editing of archive material. As a result of this relation instructors and graduate students in the department have contributed from time to time to the publications of the Library and have been given useful training in the study of manuscript as well as of printed material.

Higher Degrees in History.—The following statement regarding the specific requirements for higher degrees in history is subject to the general requirements of the Graduate School.

Master of Arts

In addition to meeting the usual tests in the specific courses taken, each candidate for this degree will ordinarily be required to pass a general written ex-

amination early in the year and toward the close of the second semester an examination, also written, in two of the following fields: ancient history; medieval history of continental Europe; modern history of continental Europe; English history; American history; Latin American history. The candidates are expected to have a general knowledge of historical bibliography (see course 103). Beginning September 1, 1928, the department will further require a working knowledge of one important foreign language, ordinarily French or German.

Doctor of Philosophy

Major Requirements.—A candidate who selects history as his major subject may offer himself for examination in any four of the fields indicated below, stating also the particular field among these four in which he wishes to specialize and in which his thesis is to be written:

1. Ancient history. 2. Medieval history and institutions of continental Europe, to the close of the thirteenth century. 3. Continental Europe from 1300 to 1648. 4. Continental Europe and its dependencies since 1648 (except as included in 5 and 6). 5. The history of England and its dependencies (not including America before 1783). 6. The history of the United States. 7. The history of Latin America. This enumeration of fields is not to be regarded as excluding the possibility of accepting others as may be determined by the department in individual cases.

Minor Subjects.—A candidate for the doctorate in history may select as his first minor one of the divisions of the field of history listed above which is not offered as a part of his major. He should preferably, however, select his minors from subjects offered by other departments. The following list of suitable minors is intended to be suggestive rather than exhaustive or compulsory.

I. In Political Science.—(Any two acceptable for a first minor; any one, for a second minor.) 1. International law and diplomacy. 2. Modern government. 3. Municipal government. 4. Constitutional and administrative law and jurisprudence. 5. Political theory.

II. In Economics and Sociology.—(Any two acceptable for a first minor; any one, for a second minor.) 1. Economic history. 2. Economic theory. 3. Public and private finance. 4. Social reform. 5. Principles of sociology.

III. In Philosophy and Education.—(Any two acceptable for a first minor; any one, for a second minor.) 1. History of ancient and medieval philosophy. 2. History of modern philosophy. 3. History of education.

IV. In Literature.—Some division of the history of literature which may be either comparative literature of a limited period or the literature of a particular country for a more extended period as may be agreed upon in each case.

Courses for Graduates

101. Seminar in American History.—*Two hours, once a week; both semesters. One unit.*

Semester I: Introduction to research in American history.

Professor Robertson

Semester II: Guidance in the investigation of selected topics.

Professor Pease

102. Seminar in English History.—A study of selected topics in the early modern period. *Arrange hours; both semesters. One unit.*

Associate Professor DIETZ

103. Historiography and Historical Method.—Required of all candidates for an advanced degree in history who do not present evidence of similar training elsewhere. *Twice a week; both semesters. One-half unit.*

Assistant Professor SWAIN

104. Seminar in European History.—*Two hours, once a week; both semesters. One unit.*

Semester I: Europe and China Since 1789.

Semester II: Statesmen of Post-War Europe.

Professor LYBYER

105. Research in Special Topics.—Guidance in writing theses for advanced degrees. *One to two units.*

Professors LARSON, LYBYER, ROBERTSON, OLMSTEAD, PEASE; Associate Professor DIETZ; Assistant Professors SWAIN, DUNBAR

106. Seminar in Medieval History.—A study of selected topics in the history of the later middle ages. *Arrange hours, both semesters. One unit.*

Professor LARSON

126. Spain in Europe and America, 1750-1825.—Bibliography, historiography, and topical reports. *Arrange hours; first semester. One unit.*

Professor ROBERTSON

127. Spanish-American Relations.—Relations of the Latin-American nations with the United States. The Monroe Doctrine, intervention, etc. *Arrange hours; second semester. One unit.* Professor ROBERTSON

150. Research in Ancient History.—Problems in the Relations of East and West. *Arrange hours; both semesters. One unit.* Professor OLMSTEAD

Courses for Graduates and Advanced Undergraduates

16a-16b. The American Colonies in the Eighteenth Century and the Beginnings of National Life and Organization.—*Three times a week; both semesters.*

Assistant Professor DUNBAR

17a-17b. Social and Economic Forces in the United States in the Nineteenth Century.—*Three times a week; both semesters.*

20a-20b. History of the South.—*Three times a week; both semesters.*

21. Recent History of the United States.—*Twice a week; first semester.*

Professor ROBERTSON

22a-22b. The History of the West to 1860.—*Twice a week; both semesters.*

Professor PEASE

25. The Civil War and the Reconstruction.—*Three times a week; first semester.* (Not given in 1928-29). Associate Professor RANDALL

26. History of the Latin-American Colonies.—*Three times a week; first semester.* Professor ROBERTSON

27. History of Latin-America from the Wars of Independence to the Present Time.—*Three times a week; second semester.* Professor ROBERTSON

29. America and Europe.—A study of the foundations of international intercourse in the later eighteenth and the early nineteenth century with particular reference to the Latin-American colonies and states. *Three times a week; second semester.* Professor ROBERTSON

30a-30b. The Mohammedan World.—*Three times a week; both semesters.* Professor LYBYER

32a-32b. The History of Europe, 1848-1928.—*Three times a week; both semesters.* Professor LYBYER

33a-33b. History of Russia with emphasis on the development of the Russian state since 1689.—*Twice a week; both semesters.* (Not given in 1928-29). Professor LYBYER

34a-34b. The History of Europe, 1648-1848.—*Three times a week; both semesters.* Assistant Professor SWAIN

36a-36b. History of Germany with emphasis on the imperial period.—*Twice a week; both semesters.* Professor LYBYER

38a-38b. Development of the French Monarchy in Early Modern Times, 1285-1648.—*Three times a week; both semesters.* (Not given in 1928-29). Professor JONES

39a-39b. The Renaissance and the Reformation.—The transition from medieval to modern ideals. *Three times a week; both semesters.* (Not given in 1928-29). Associate Professor JONES

44a-44b. Constitutional History of England.—*Three times a week; both semesters.* Professor LARSON

46a-46b. The Industrial Revolution and English Social Politics, 1750-1928.—*Three times a week; both semesters.* Associate Professor DIETZ

48. Medieval Institutions: Social, Political, and Economic.—*Twice a week; second semester.* Professor LARSON

51a-51b. Hebrew History.—*Twice a week; both semesters.* Professor OLMSTEAD

52. The Hellenistic Age.—*Three times a week; first semester.*
Professor OLMSTEAD

53. Assyrian History.—*Three times a week; second semester.*
Professor OLMSTEAD

54. History of Ancient Egypt.—*Three times a week; second semester.* (Not given in 1928-29). Professor OLMSTEAD

57. The Roman Empire.—Special attention will be devoted to the organization and administration of the empire, the life in the provinces, the progress of the Oriental Religions, and the relations of the empire to Christianity. *Three times a week; first semester.* (Not given in 1928-29). Professor OLMSTEAD

59. Prehistory.—*Three times a week; second semester.* (Not given in 1928-29). Professor OLMSTEAD

60. The United States in the Great War.—*Three times a week; second semester.* (Not given in 1928-29). Associate Professor RANDALL

62a-62b. Constitutional History of the United States.—*Three times a week; both semesters.* (Not given in 1928-29). Associate Professor RANDALL

HOME ECONOMICS

Students electing graduate courses dealing with food and nutrition will present chemistry, 20 hours (including quantitative and organic); bacteriology, 5 hours; physiology, 5 hours; food and dietetics, 10 hours; nutrition, 2 to 5 hours. For the more general problems involved in 101, students must present food and dietetics, 10 hours; textiles and clothing, 8 hours; chemistry, 12 hours; physiology, 5 hours; principles of economics, 3 hours.

Courses for Graduates

101. Home Economics.—Each member of the class selects a problem for continuous work and report. *Twice a week; both semesters. One unit.*
Professor WARDALL

102. Research in Food and Nutrition.—*Twice a week; both semesters. One to two units.*

103. Nutrition Seminar.—Students registering for this course should have a reading knowledge of French or German. *Once a week; both semesters. One-half unit.*

Courses for Graduates and Advanced Undergraduates

20. Infant Nutrition.—*Twice a week; second semester.*

28. Organization and Management of the Household.—*Twice a week; second semester.* Miss FORD

31. Clothing.—*Three times a week; second semester.*
Assistant Professor JACOBSEN

33. Diet in Disease.—*Three times a week; both semesters.*
Assistant Professor BARTO

35. Experimental Cookery.—*Three times a week; second semester.*
Miss ————

39a-39b. Readings in Food and Nutrition.—*Once a week; both semesters.*
Assistant Professor BARTO

41. Problems in Nutrition.—*Three to five times a week; second semester.*
Miss PLANT

43a-43b. Problems in Textiles and Clothing.—*Three times a week; both semesters.*
Assistant Professor JACOBSEN;
Misses WEAVER, WHITLOCK, MCCULLOUGH, BARNES

45. Nutrition Classes.—*Twice a week; second semester.*
Assistant Professor BARTO

48. Institutional Dietaries and Administration.—*Three times a week; second semester.*
Miss SMITH

50. Costume Design.—*Three times a week; second semester.* Miss BARNES

57a-57b. Problems in Household Management.—*Three times a week; both semesters.*
Miss FORD

HORTICULTURE

At least twenty hours of collegiate work in horticulture and allied subjects and specific preparation for the chosen topics are required for entrance on major work in this department.

Students desiring to specialize in plant breeding (or animal breeding) are referred to the Zoology Department for the fundamental courses in Genetics.

Courses for Graduates

103. Olericulture.—*Both semesters. One to two units.* Professor LLOYD

108. Pomology.—*Both semesters. One to two units.*
Professors BLAIR, LLOYD, DORSEY, RUTH; Associate Professor ANDERSON

115. Floriculture.—*Both semesters. One to two units.*
Professor DORNER; Assistant Professor WEINARD

Courses for Graduates and Advanced Undergraduates

12. Evolution of Horticultural Plants.—*Three times a week; first semester.*
Professor DORSEY

18. Experimental Horticulture.—For advanced students preparing for experiment station work. *Three times a week; second semester.* Professor DORSEY

43. Greenhouse Fertilizers.—*Three times a week; first semester.*
Professor DORNER; Assistant Professor WEINARD

44. Pomology Seminar.—For seniors and graduates specializing in pomology. *Once a week; both semesters.* Professor RUTH

45. Plant Nutrition.—*Three times a week; second semester.*
Professor DORNER; Assistant Professor WEINARD

46. Marketing Horticultural Products.—Required inspection trip, expenses about $20. For seniors and graduates specializing in horticulture. *Three times a week; first semester.* Professor LLOYD

47. Fruit Production and Storage.—The effects of environment upon fruit trees and fruits. The storage of fruits. *Three times a week; first semester.* Professor RUTH

51. Fruit Diseases.—*Three times a week; second semester.*
Associate Professor ANDERSON

LIBRARY SCIENCE

Candidates for the Master's degree in Library Science must have completed at least thirty semester hours' work in Library Science in this institution or in an approved institution.

Students desiring to prepare for work in special types of libraries will be expected to include at least one unit of advanced courses in appropriate subjects other than Library Science. All such changes in the program of the student must be approved by the Director of the Library School.

Courses for Graduates

101. Thesis.—*One to two units.*
Professor WINDSOR; Associate Professor SIMPSON, and others

102. Seminar.—Special topics in library administration and history, and in bibliography. *Once a week; both semesters. One-half to one unit.*
Professor WINDSOR; Associate Professor SIMPSON, and others

103. Advanced Reference Problems.—Transactions of societies; government publications; periodicals and indexes. *Twice a week; first semester. One-half unit.* Associate Professor SIMPSON

104. Advanced Cataloging and Classification.—Systems of book classification; comparative rules for cataloging books; bibliographical institutions. *Twice a week; second semester. One-half unit.* Assistant Professor BOND

Courses for Graduates and Advanced Undergraduates

7. History of Libraries.—The foundation, development, and resources of the leading libraries of Europe and the United States. *Twice a week; second semester.* Associate Professor SIMPSON

9. History of Books and Printing.—History of the early forms of books; the invention and spread of printing; the book trade; book-binding. *Twice a week; second semester.* (Not given in 1928-29). Professor WINDSOR

13a. Public Documents.—Publications of United States government and their use as sources of information. *Twice a week; first semester.* Assistant Professor BOYD

24a-24b. Selection of Books.—Foreign fiction; drama; poetry; special problems in selection. *Twice a week; both semesters.* Miss HOSTETTER

26b. Library Administration.—Library organization; work with children; special topics. An inspection trip to libraries and book-publishing houses, requiring about one week and costing approximately $30. *Three times a week; second semester.* Miss GRAMESLY and others

42. Public Documents.—Publications of American states and municipalities; publications of foreign governments. *Three times a week; second semester.* Assistant Professor BOYD

43. High School Library Administration.—*Twice a week; second semester.* Miss HOSTETTER

44. Bookbuying for Large Libraries.—The problems in book purchase which must be met in the order departments of large libraries. *Twice a week; first semester.* Miss GARVER

45. Library Buildings.—The planning of library buildings and the selection of equipment with special emphasis on the administrative aspects. *Twice a week; first semester.* Professor WINDSOR; Miss GRAMESLY

MATHEMATICS

Students entering on graduate study with a major in mathematics must have had twenty-five hours of undergraduate work in mathematics, including a one-year course in calculus and one advanced course such as a course in theory of equations, or in differential equations. They should be able to read German and French.

Candidates for a doctor's degree taking a first minor in mathematics are expected to have completed a course in calculus and are required to take two one-year courses beyond the calculus; candidates for a doctor's degree taking a second minor are required to complete at least one course throughout a year beyond the calculus.

The courses offered by the department are arranged in cycles of two or of three years, so that a student will have opportunity to take any particular course offered by the department, for which he is qualified, in three years of residence required for the doctor's degree.

Courses for Graduates

100. Seminar.—*Three times a week; both semesters. One to two units.* Professors TOWNSEND, MILLER, SHAW, CARMICHAEL, EMCH, COBLE; Associate Professor CRATHORNE; Assistant Professors HAZLETT, LYTLE, LEVY, BRAHANA, GREEN, MARIA

101. Functions of Real Variables.—*Three times a week; both semesters. One unit.* Professor TOWNSEND

102. Functions of a Complex Variable.—*Three times a week; both semesters. One unit.* (To be given in 1929-30). Professor TOWNSEND

110. Elliptic Functions.—*Three times a week; both semesters. One unit.* (To be given in 1929-30). Professor CARMICHAEL

112. Linear Difference Equations.—*Three times a week; both semesters. One unit.* Professor CARMICHAEL

113. Linear Differential Equations.—*Three times a week; both semesters. One unit.* (To be given in 1930-31). Professor CARMICHAEL

122. Modern Algebra.—*Three times a week; both semesters. One unit.*

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124. The Theory of Numbers.—First semester: Theory of congruences and residues. Second semester: Theory of algebraic numbers. *Three times a week; both semesters.* (To be given in 1929-30). Assistant Professor HAZLETT

126. Theory of Groups.—Introductory course. *Three times a week; both semesters. One unit.* (To be given in 1929-30). Professor MILLER

127. Theory of Groups.—Advanced course. *Three times a week; both semesters. One unit.* Professor MILLER

129. Theory of Statistics.—The mathematical theory underlying statistics with applications to problems in economics, biology, and sociology. *Three times a week; both semesters. One unit.* Associate Professor CRATHORNE

131. Advanced Algebraic Geometry.—*Three times a week; both semesters. One unit.* (To be given in 1930-31). Professor EMCH

132. Projective Geometry.—*Three times a week; first semester. One unit.* (To be given in 1929-30). Professor EMCH

135. Differential Geometry.—*Three times a week; both semesters. One unit.* Assistant Professor LEVY

136. Non-euclidean Geometry.—*Three times a week; first semester. One unit.* (To be given in 1929-30).

137. Algebraic Forms.—*Three times a week; second semester. One unit.* (To be given in 1929-30). Professor COBLE

138. Algebraic Geometry and Related Function Theory.—*Three times a week; both semesters. One unit.* Professor COBLE

139. Analysis Situs.—*Three times a week; both semesters. One unit.* Assistant Professor BRAHANA

141. Vector Methods.—*Three times a week; both semesters. One unit.* (To be given in 1929-30). Professor SHAW

143. Linear Algebra.—*Three times a week; both semesters. One unit.* (To be given in 1930-31). Professor SHAW

145. Linear Operations.—*Three times a week; both semesters. One unit.* Professor SHAW

Courses for Graduates and Advanced Undergraduates

10. Theory of Equations and Determinants.—*Three times a week; first semester.* Professor MILLER

16-17. Differential Equations and Advanced Calculus.—*Three times a week; both semesters.* Professor TOWNSEND

18. Constructive and Projective Geometry.—*Three times a week; second semester. One unit.* Dr. BENNETT

20. Graphical and Numerical Methods.—*Three times a week; second semester.* Assistant Professor GREEN

21. Theory of Probability.—*Three times a week; second semester.* Associate Professor CRATHORNE

22. Statistics.—May be counted only toward a minor in mathematics. *Three times a week; first semester.* Associate Professor CRATHORNE

30-31. Actuarial Theory.—*Three times a week; both semesters.* (To be given in 1929-30). Associate Professor CRATHORNE

32. History of Mathematics.—*Three times a week; second semester.* Assistant Professor LYTLE

35. Teachers' Course.—May be counted only toward a minor in mathematics. *Three times a week; first semester.* Assistant Professor LYTLE

40. Fundamental Concepts of Mathematics.—*Three times a week; second semester.* (To be given in 1929-30). Assistant Professor LYTLE

91. Introduction to Modern Mathematics.—*Three times a week; both semesters.* Professors COBLE, CARMICHAEL

MECHANICAL ENGINEERING

The prerequisite for graduate work in mechanical engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in mechanical engineering in the branches of the subject in which registration is desired.

Courses for Graduates[1]

107. Thermodynamics and Heat Motors.—*Twice a week; both semesters. One unit.* Professor GOODENOUGH

109. Mechanical Engineering Design.—*Twice a week; either semester. One unit.* Professor LEUTWILER

112. Laboratory Investigations.—*Three times a week; both semesters. One and one-half units.*
Professors WILLARD, KRATZ, POLSON, and Associate Professor MACINTIRE

115. Theory of Internal Combustion Engines.—*Twice a week; either semester. One unit. Time to be arranged.* Professor GOODENOUGH

MECHANICS, THEORETICAL AND APPLIED

The prerequisite for the courses for graduates in theoretical and applied mechanics is the equivalent of the undergraduate courses in theoretical and applied mechanics and in allied engineering subjects required for the degree of Bachelor of Science in engineering.

Courses for Graduates

101. Analytical Mechanics.—*Twice a week; first semester. One unit.* Professor MOORE

102. Resistance of Materials.—*Twice a week; second semester. One unit.* Professor MOORE

103. Hydraulics and Hydraulic Engineering.—*Twice a week; second semester. One-half to one unit.* Professor ENGER

104. Experimental Work in Laboratory of Applied Mechanics.—*Twice a week; both semesters. One-half to two units.* Professors MOORE and ENGER

105. Experimental and Analytical Work in Reinforced Concrete.—*Twice a week; both semesters. One to two units.* Assistant Professor RICHART

106. Theory of Elasticity and Applications to Engineering Problems.—*Three times a week; both semesters. One unit.* Professor WESTERGAARD

Courses for Graduates and Advanced Undergraduates[2]

41. Advanced Mechanics of Materials.—*Three times a week; first semester.* Professor SEELY

42. The Properties of Engineering Materials; Specifications and Inspection.—*Twice a week; second semester.* Professor SEELY

[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other departments.
[2]Other courses offered Senior students are open for minor credit to students majoring in other departments.

43. Laboratory Work in Hydraulics.—*Twice a week; first semester.*
Professor ENGER

44. Laboratory Work in Testing Materials.—*Three times a week; second semester.* Professor MOORE

45. Advanced Statics.—*Three times a week; first semester.*
Professor WESTERGAARD

46. Advanced Statics.—*Twice a week; second semester.*
Professor WESTERGAARD

METEOROLOGY

(See Geology)

MINERALOGY

(See Geology)

MINING ENGINEERING

The prerequisite for graduate work in mining engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in mining in the branches of the subject in which registration is desired.

In addition to the regular University laboratories, the laboratory connected with the investigation of mining conditions in Illinois now being carried on jointly by the Engineering Experiment Station through the Department of Mining Engineering and the State Geological Survey is available for graduate instruction.

Courses for Graduates

101. Advanced Mining Practice.—*Twice a week; either semester. One unit.*
Professor CALLEN

102. Advanced Preparation of Coal and Ores.—*Twice a week; first semester. One unit.* (Not given in 1928-29.)

104.[1] **Mining Reports.**—*Twice a week; either semester. One unit.*
Professor CALLEN

105.[1] **Welfare Work and Education Among Mine Employees.**—*Twice a week; either semester. One unit.* Professor CALLEN

106. Advanced Coal, Ore, and Metallurgical Plant Design.—*Twice a week; either semester. One unit.* (Not given in 1928-29.)

107. Advanced Non-Ferrous Metallurgical Projects.—*Twice a week; either semester. One unit..* (Not given in 1928-29.)

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[1]Of courses 104 and 105 only one will be given either semester, according to election of students.

Courses for Graduates and Advanced Undergraduates

6. Mechanical Engineering of Mines.—*Three times a week; second semester.* Professor CALLEN

8. Mine Administration.—*Three times a week; first semester.* Assistant Professor MARSHALL

9. Preparation of Coal and Ores.—*Three times a week; first semester.* Mr. MITCHELL

16. Non-Ferrous Ore Treatment.—The reduction of gold, silver, copper, lead and zinc ores. *Five times a week; second semester.* Mr. MITCHELL

15. Mine Ventilation.—*Twice a week; first semester.* Professor CALLEN

20. Mine Ventilation Laboratory.—*Twice a week; first semester.* Professor CALLEN

21. Mine Examination and Valuation.—*Three times a week; second semester.* Assistant Professor MARSHALL

41. Principles of Mining and Metallurgical Design.—*Three times a week; first semester.* Assistant Professor MARSHALL

42. Mining and Metallurgical Design.—*Twice a week; second semester.* Assistant Professor MARSHALL

64. Mining Laboratory.—*Three times a week; second semester.* Mr. MITCHELL

PHILOSOPHY

Students who enter on graduate work with philosophy as their major subject must have had a general course in the history of philosophy, a course in logic, and a general course in psychology.

Courses for Graduates

103. Ethics.—*Twice a week; first semester. One unit.* Professor DANIELS

105. Seventeenth Century Continental Thought.—*Twice a week; second semester. One unit.* Professor DANIELS

108. Plato.—*Twice a week; first semester. One unit.* Professor MCCLURE (Not given in 1928-29).

110a. History of British Philosophy from 1600 to 1750.—*Twice a week; first semester. One unit.* (Not given in 1928-29). Associate Professor LAMPRECHT

110b. History of British Philosophy from 1750 to the Present.—*Twice a week; second semester. One unit.* (Not given in 1928-29). Associate Professor LAMPRECHT

112. German Idealism.—*Twice a week; second semester. One unit.* (Not given in 1928-29). Professor McClure

113. Metaphysics.—*Twice a week; first semester. One unit.*
Associate Professor Lamprecht

114. Theory of Knowledge.—*Twice a week; second semester. One unit.*
Associate Professor Lamprecht

Courses for Graduates and Advanced Undergraduates

3. History of Ancient and Medieval Philosophy.—*Three times a week; first semester.* Professor McClure

4. History of Modern Philosophy.—*Three times a week; second semester.*
Professor McClure

7. Ethics.—*Three times a week; second semester.* Professor Daniels

9. Political and Social Ethics.—*Three times a week; first semester.*
Professor Daniels

10. Principles and Concepts of Science.—*Three times a week; first semester.*
Dr. Benjamin

11. Philosophy of Religion.—*Three times a week; second semester.*
Associate Professor Lamprecht

19. Conflict of Ideals in Modern Thought.—*Three times a week; first semester.* Associate Professor Lamprecht

PHYSICS

The prerequisite for graduate work in physics is a college course in general physics with a one-year laboratory course in introductory physical measurements. The student who is to do major work in physics should also have had additional courses in physics or teaching experience, unless the training in his minor subjects, mathematics or chemistry, has been strong and complete. He should also have a knowledge of French and German sufficient to use references in these languages. The courses named below are those open for candidates for the master's or doctor's degree. A large part of the last year's work of the candidate for the doctor's degree is investigational, along either the experimental or the theoretical side of physics. In addition to these major graduate courses, the courses in elementary dynamics, heat, light, electrical measurements, and introductory electrical theory are arranged with certain additions for the graduate credit. The intermediate courses on electricity and magnetism, heat and light (Physics 15, 16, 17) may be offered with certain additions by candidates for the master's degree and then generally only as minors.

Courses for Graduates

104a-104b. Electrical and Magnetic Measurements.—*Two times a week of three hours each; both semesters. One unit.* (Courses 104a and 104b are recommended for graduate students in chemistry.)
Professor Knipp; Assistant Professor Williams

120. Light.—Advanced theories and applications in geometric and physical optics. Lectures, assigned readings and recitations, with laboratory experiments. *Both semesters. One to two units.*

Associate Professor SCHULZ; Assistant Professor PATON

121. Recent Advances in Physics and the Electron Theory.—This will be in conjunction with 124a. *Once every two weeks; first semester. One-fourth unit.*

Professor KNIPP

123. Sound.—*Twice a week; second semester. One-half to one unit.*

Professor WATSON

124a-124b. Conduction of Electricity Through Gases.—*Three times a week; both semesters. One unit.* Professor KNIPP

125. Architectural Acoustics.—Theoretical and experimental investigations on the acoustics of buildings. *Twice a week; both semesters. One unit.*

Professor WATSON

126. Physics Colloquium.—Attendance is expected of all the graduate students. *Once a week; both semesters. No credit.*

127a-b. Recent Problems in Physics.—Quantum Theory and Spectrum Lines. *Twice a week; both semesters. One-half unit.* (Not given in 1928-29).

Professor KUNZ

128. Some Problems and Methods in Theoretical Physics.—*Three times a week; second semester. One unit.* Assistant Professor LIBMAN

131. Investigation of Special Problems.—*Two to four times a week; both semesters. One to two units.*

Professors CARMAN, KNIPP, WATSON; Associate Professor SCHULZ; Assistant Professors WILLIAMS, PATON

132a. Dynamics.—*Four times a week; both semesters. One unit.* (Not given in 1928-29). Professor KUNZ

132b. Electrodynamics.—*Four times a week; both semesters. One unit.* (Not given in 1928-29). Professor KUNZ

132c. Hydrodynamics.—Especially theory of flowing fluids and gases. *Four times a week; both semesters. One unit.* (Not given in 1928-29).

Professor KUNZ

132d. Electric Oscillations.—*Twice a week; both semesters. One-half unit.* (Not given in 1928-29). Professor KUNZ

132e. Thermodynamics and Kinetic Theory of Matter.—*Four times a week; both semesters. One unit.* Assistant Professor LIBMAN

132f. Theory of Elasticity.—*Three times a week; second semetser. One unit.* (Not given in 1928-29). Professor KUNZ

133. Seminar.—*Three or five times a week; both semesters. One to three units.* Professors CARMAN, KNIPP, WATSON, KUNZ; Associate Professor SCHULZ

Courses for Graduates and Advanced Undergraduates

44a-44b. Electrical and Magnetic Measurements.—*Twice a week; both semesters.* Professors KNIPP, WILLIAMS

14a. Introduction to Theoretical Physics.—Dynamics.—*Twice a week; first semester.* Dr. WALL

15. Electricity and Magnetism.[1]—Recommended to students in non-technical courses who wish a knowledge of electricity and magnetism beyond the course in general physics. *Two recitations or lectures and one three-hour laboratory exercise weekly; first semester.* Dr. SANDERS

16. Heat.[1]—*Three times a week; second semester.* Assistant Professor LIBMAN

17a-b. Light.[1]—*Three times a week; both semesters.* Assistant Professor PATON

20a-b. Light.—Special phenomena and applications. *Three times a week; both semesters.* Associate Professor SCHULZ

22a-b. Special Light Measurements.—*Twice a week; both semesters.* Associate Professor SCHULZ

23. Sound.—*Three times a week; first semester.* Professor WATSON

24. Properties of Matter.—*Twice a week; second semester.* Assistant Professor WILLIAMS

27. Fundamental Physical Measurements.—*Once or twice a week; second semester. One-half or one unit.* Assistant Professor WILLIAMS

30. Introduction to Theoretical Electricity.—For advanced students in physics, chemistry, mathematics, and engineering. *Three times a week; second semester.* Assistant Professor WILLIAMS; Dr. WALL

33. Sound.—The theory of sound as given in Physics 23 should be taken with this course. *Once a week; first semester.* Professor WATSON

45. Principles of Radiation.—*Twice a week; both semesters.* Assistant Professor PATON; Dr. SANDERS

46a-b. Advanced Electrical Measurements.—*Two times a week of three hours each; both semesters. Three-fourths unit.* Assistant Professor WILLIAMS

50. Theory and Use of Optometric and Other Optical Instruments.—*Four times a week; first semester.* Associate Professor SCHULZ

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[1]This course may be taken for a minor credit or as *first* year major credit only.

PHYSIOLOGY

The prerequisites for graduate work in physiology are Physiology 1 or 4, 2 and 6 or equivalent.

Courses for Graduates

101. Journal Club.—Review of literature. *Both semesters. One-fourth unit.*
Associate Professor BURGE

102. Research.—*Both semesters.* One to two units.
Associate Professor BURGE

103. Special Phases of the Physiology of Respiration, Circulation, Digestion, Metabolism, Excretion, Secretion, Glands of Internal Secretion, Nervous System.—*Both semesters. One-half to one unit.* Associate Professor BURGE

Courses for Graduates and Advanced Undergraduates

7. Advanced Mammalian Physiology.—*Three times a week; first semester.*
Associate Professor BURGE

POLITICAL SCIENCE

Graduate work in political science is conducted in the following special fields: (1) political theory; (2) international law and diplomacy; (3) modern government; (4) constitutional law, administrative law, and jurisprudence; (5) municipal administration.

To be admitted to take political science as a major subject, the student must have done at least 18 hours of undergraduate work in political science, economics, and history, not less than nine hours of which have been in political science. To take political science as a minor he must have had at least nine hours' work in these fields, including six hours in political science.

If a student making political science his major is taking both of his minors in other departments, one of them must be in history, economics, or sociology.

Several courses given in other departments are so closely related to those in political science that graduate students whose major is political science may be permitted on petition to take such courses as part of their major work. Attention is also called to the courses in city planning given by the department of horticulture, and the technical courses given by the department of municipal and sanitary engineering.

Courses for Graduates

101. History of Political Theories.—*Three times a week; first semester. One unit.*

102. The Nature of the State.—*Twice a week; second semester. One unit.*
Professor FAIRLIE

103. Seminar in Political Science and Public Law.—*Once a week; both semesters.* Members of the department

104. Municipal Administration.—*Twice a week; first semester. One unit.*
Professor FAIRLIE

105. **The American Constitutional System.**—*Twice a week; second semester. One unit.* (Not given in 1928-29). Professor MATHEWS

106a. **Special Topics in International Law.**—Research course. *Twice a week; first semester. One unit.*

106b. **Special Topics in International Law.**—Research course. *Twice a week; second semester. One unit.*

107. **Foreign Relations of the United States.**—*Twice a week; first semester. One unit.* Professor MATHEWS

112. **Public Administration.**—Studies in national or local administration in the United States. *Once a week; second semester.* Professor FAIRLIE

113. **State Government and Administration.**—*Twice a week; second semester. One unit.* (Not given in 1928-29). Professor MATHEWS

114. **Studies in Political Parties.**—*Twice a week; second semester. One unit.* Assistant Professor BERDAHL

135. **Legal Problems of the City.**—*Twice a week; first semester. One unit.* (Not given in 1928-29).

Courses for Graduates and Advanced Undergraduates

4. **Municipal Government.**—*Three times a week; first semester.* Professor FAIRLIE

5. **Constitutional Law of the United States.**—*Three times a week; first semester.* Professor MATHEWS

6a. **International Law: Law of Peace.**—*Three times a week; first semester.*

6b. **International Law: Law of War and Neutrality.**—*Three times a week; second semester.*

7. **American Diplomacy.**—*Three times a week; second semester.* Professor MATHEWS

8. **International Organization.**—*Twice a week; second semester.* Assistant Professor BERDAHL

9. **Principles of Jurisprudence.**—*Three times a week; second semester.* Professor FAIRLIE

10. **Administrative Law.**—*Twice a week; second semester.* (Not given in 1928-29). Professor FAIRLIE

11. **Constitutional Aspects of Social and Industrial Problems.**—*Three times a week; second semester.* Assistant Professor BERDAHL

12. **National Administration in the United States.**—*Three times a week; first semester.* Professor FAIRLIE

13. State Administration in the United States.—*Three times a week; second semester.* (Not given in 1928-29). Professor MATHEWS

14a. Political Parties: Historical Development.—*Three times a week; first semester.* (Alternates with Political Science 14b). Assistant Professor BERDAHL

14b. Political Parties: Party Organization and Methods.—*Three times a week; first semester.* (Alternates with Political Science 14a). Assistant Professor BERDAHL

17. Judicial Organization and Administration.—*Twice a week; first semester.* (Not given in 1928-29). Professor MATHEWS

18. Legislation in the United States.—*Three times a week; second semester.* (Not given in 1928-29).

21. British Government.—*Twice a week; first semester.* Professor FAIRLIE

22. Continental European Governments.—The political systems of France, Germany, Italy, Switzerland, and Russia. *Three times a week; second semester.*

27. Public Opinion.—A study of motives as causal factors in the genesis of political practices. *Three times a week; first semester.* Dr. CASEY

28. Problems of Contemporary Politics.—A survey of factors of major importance in domestic and foreign politics. *Three times a week; second semester.* Dr. CASEY

34. Municipal Problems.—Municipal administration in the United States and Europe. *Three times a week; second semester.* Professor FAIRLIE

PSYCHOLOGY

Graduate students who elect psychology as their major subject must have had standard courses, of university grade, both in general psychology and in the psychological laboratory. One general university course is the minimal requirement for graduate students who apply to the department for a minor subject.

102. Translation of Psychological Treatises.—Reading and systematic interpretations of standard works in foreign languages. *First semester. One-half unit.* Professor

103. Research.—Experimental investigations. *Both semesters. One-half to two units.* Professor

105. Seminar.—Psychological principles and doctrines; current trends. *Once a week; two hours; both semesters. One unit.* Professor

106. Neural Theory of the Psychological Functions.—*Second semester. One unit.* Assistant Professor CULLER

107. Psychological Theory.—A critical examination of the postulates of contemporary psychology. *Once a week, two hours; first semester. One unit.* Assistant Professor YOUNG

Courses for Graduates and Advanced Undergraduates

4. Psychological Measurements.—The metric and correlational methods. *Twice a week; both semesters.* Assistant Professor CULLER

5. Comparative Psychology.—Mind in the animal forms. *Twice a week; first semester.* Assistant Professor HIGGINSON

9. Experimental Psychology.—The psychophysiological relationships. *Three times a week; second semester.* Assistant Professor YOUNG

11. Learning and Comprehension.—*Twice a week; second semester.* Assistant Professor CULLER

12-13. Minor Problems.—Methods suitable to new problems. *Three times a week; both semesters.* Assistant Professor HIGGINSON; Dr. SULLIVAN

14. Social Psychology.—*Three times a week; second semester.* Dr. SULLIVAN

16. Genetic Psychology.—*Twice a week; first semester.* Assistant Professor YOUNG

[**17. The History of Psychology.**—*Three times a week; second semester.* (Not given in 1927-28).]

18. Perception.—*Twice a week; first semester.* Assistant Professor CULLER

20. Systematic Psychology.—*Twice a week; second semester.* Professor ————

30. Attention.—*Twice a week; second semester.* Dr. MÖLLER

RAILWAY ENGINEERING

The prerequisite for graduate work in railway engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in railway engineering in the branch of the subject in which registration is desired.

Courses for Graduates

102. Locomotive Design.—*Once a week; both semesters. One unit.* Professor YOUNG

106. Locomotive Operation.—*Once a week; both semesters. One unit.* Professor SCHMIDT

110. Railway Location.—*Once a week; both semesters. One unit.* Professor KING

Courses for Graduates and Advanced Undergraduates

3. Locomotives.—*Twice a week; first semester.* Mr. SCHRADER

4. Locomotives.—*Three times a week; second semester.* Mr. SCHRADER

33. Economic Theory of Railway Location.—*Four times a week; second semester.* Professor KING

62-64. Electric Railway Laboratory and Practice.—*Five times a week; first semester.* Assistant Professor TUTHILL

70-74. Electric Railway Design and Economics.—*Five times a week; second semester.* Assistant Professor TUTHILL

ROMANCE LANGUAGES AND LITERATURES

Before entering on the study of Romance languages as a major for the degree of A.M., the candidate must have had at least (a) three years of college work in one Romance language, together with a satisfactory reading knowledge of another; or (b) two years of college work in each of two Romance languages. In either case a reading knowledge of German is highly desirable. Before being accepted as a recognized candidate for the degree of Ph.D., he must have had in addition, satisfactory training in Latin, and must be able to read ordinary German prose. Before entering on the study of Romance languages as a first or second minor, the candidate must have had two years of college work in the language desired.

FRENCH

Courses for Graduates

101. Old French Literature.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor OLIVER

102. Villon, Rabelais, Montaigne, la Pléiade.—(In French). *Once a week; both semesters. One-half unit.* (Not given in 1928-29). Professor CONS

103. Seventeenth Century Prose Writers.—*Twice a week; both semesters. One unit.* Professor OLIVER

104. Eighteenth Century Prose Writers.—*Twice a week; both semesters. One unit.* Professor OLIVER

106. La Fontaine et les Fables.—Sources, analyse critique et stylistique. (In French). *Once a week; both semesters. One-half unit.* Professor CONS

127. French Romanticism.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor CARNAHAN

128. Origin and Development of the Novel in France.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor CARNAHAN

142. Cours d'Explication Française.—Lecture méthodique et analytique du point de vue de la langue, du style, des idées et des sources de textes illustrant l'histoire de la littérature française. (In French). *Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor CONS

143. Littérature Française Contemporaine.—Etude des influences sociales, artistiques, philosophiques et scientifiques sur le mouvement littéraire de 1880 environ jusqu'à nos jours. (In French). *Twice a week; both semesters. One unit.* Professor Cons

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of French Literature.—*Three times a week; both semesters.* Doctors Palfrey, Ashton

11. Selected Topics from the History of French Literature.—(Open to students who have had or are taking French 10, or the equivalent). *Twice a week; both semesters.* Professor Cons

17a-17b. French Drama of the Nineteenth and Twentieth Centuries.—*Twice a week; both semesters.* Assistant Professor Hamilton

24a-24b. French Drama of the Seventeenth and Eighteenth Centuries.—*Three times a week; both semesters.* Professor Oliver

29a-29b. French Lyric Poetry.—*Twice a week; both semesters.* Dr. Palfrey

32a-32b. Le Roman et la Nouvelle au 19ème et au 20ème Siècles.—(In French). *Three times a week; both semesters.* Professor Cons

ITALIAN

Courses for Graduates

140. Italian Literature of the Thirteenth and Fourteenth Centuries. Dante, Petrarch, Boccaccio.—*Twice a week. One unit.* (Not given in 1928-29). Associate Professor Van Horne

143. Italian Literature of the Fifteenth and Sixteenth Centuries.—*Twice a week. One unit.* Associate Professor Van Horne

146. Modern Italian Literature.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Associate Professor Van Horne

Courses for Graduates and Advanced Undergraduates

3a-3b. Introduction to Italian Literature.—*Twice a week; both semesters.* Associate Professor Van Horne

SPANISH

Courses for Graduates

132. The Novela of the Golden Age.—*Twice a week; both semesters. One unit.* Professor Fitz-Gerald

133. The Origin of the Spanish Novela and of the Comedia.—*Twice a week; both semesters. One unit.* Professor Fitz-Gerald

135. The Modern Novel in Spain.—*Twice a week; both semesters. One unit.*
Assistant Professor HAMILTON

138. Spanish-American Literature.—*Twice a week; both semesters. One unit.*
Associate Professor VAN HORNE

139. Spanish Literature in the Middle Ages.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor FITZ-GERALD

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of Spanish Literature.—*Three times a week; both semesters.* Assistant Professor HAMILTON

11a-11b. Spanish Drama of the Sixteenth and Seventeenth Centuries.—*Twice a week; both semesters.* Associate Professor VAN HORNE

17a-17b. Modern Spanish Drama.—*Twice a week; both semesters.* (Not given in 1928-29). Associate Professor VAN HORNE

ROMANCE PHILOLOGY

Courses for Graduates

171. Introduction to Romance Philology.—*Twice a week; both semesters. One unit.* Professor FITZ-GERALD

173. Vulgar Latin.—A study of texts from late Latin authors with special reference to the formation of the Romance Languages. *Twice a week; both semesters. One unit.* (Not given in 1928-29).

175. Old French Phonology and Morphology.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor OLIVER

179. Old Provençal.—*Once a week. One-half unit.* (Not given in 1928-29).

185. Oldest Monuments of the Spanish Language; Palaeography; Origins of Spanish Poetry.—*Twice a week; both semesters. One unit.* (Not given in 1928-29). Professor FITZ-GERALD

195. Seminar.—Research work in preparation for theses in the field of Romance languages. *Both semesters. One to two units.*
Members of the Department

SOCIOLOGY

Preparation for graduate work in sociology must include at least the equivalent of twelve semester hours in the social sciences, of which at least three must be in sociology, and three in the principles of economics. The remainder may be in any combination of these two subjects, or of history and political science.

Courses for Graduates

100. Bases of Social Theory.—*Twice a week; first semester. One-half to one unit.* Professor HAYES

102a. Earlier Developments in Sociology.—*Twice a week; first semester. One unit.* Professor HAYES

102b. More Recent Developments in Sociology.—*Twice a week; second semester. One unit.* Professor HAYES

108. Research in the Social Effects of Poverty, Together with Their Prevention and Treatment.—*Twice a week; first semester. One unit.* Dr. MOORE

109. Research in Criminology.—*Twice a week; second semester. One unit.* (Not given in 1928-29). Professor TAFT

112. The Sociology of Conflict.—*Twice a week; second semester. One unit.* Professor TAFT

128. Culture Contacts; Accommodation; Assimilation; Americanization.—*Twice a week; second semester. One unit.* (Not given in 1928-29). Dr. HILLER

150. Seminar.—Preparation of theses. *One to two units.*
Professor HAYES and other members of the department

Courses for Graduates and Advanced Undergraduates

2. Social Relations.—*Three times a week; first semester.* Mr. KROUT

3. Social Evolution.—*Three times a week; first or second semester.*
Assistant Professor ABEL

4. Social Control.—*Twice a week; second semester.* Professor HAYES

6. The City.—A study of the development, characteristics and social problems of urban communities. *Three times a week; first semester.* Dr. TYLOR

7. Social Problems of Agricultural Society.—*Three times a week; second semester.* Dr. TYLOR

8. Charities.—*Three times a week; first or second semester.* Dr. MOORE

9. Criminology.—*Three times a week; first or second semester.*
Professor TAFT

10. Problems of Population.—*Three times a week; first semester.* Dr. HILLER

17. Methods of Sociological Research.—*Three times a week; second semester.* Assistant Professor ABEL

27. Community Organization.—*Twice a week; second semester.* Mr. KROUT

28. Immigration and Assimilation.—*Three times a week; first or second semester.* Dr. HILLER

29. Public Opinion.—(The same as Political Science 27). *Three times a week; first semester.* Dr. CASEY

41. Labor Problems and Labor Organization.—(The same as Economics 41). *Three times a week; first semester.* Assistant Professor BERMAN

42. Labor Legislation.—(The same as Economics 42). *Three times a week; second semester.* Assistant Professor BERMAN

44. Socialism and Economic Reform.—(The same as Economics 44). *Twice a week; first semester.* Assistant Professor BERMAN

TRANSPORTATION

Transportation may be taken as a major or minor for the master's degree and as a minor for the doctorate. No student will be admitted to graduate work in transportation unless he has a satisfactory acquaintance with the principles of economics and in addition such knowledge of the general problems of transportation as is represented by the content of the undergraduate course on the transportation system of the United States.

Course for Graduates

100. Railroad Problems.—*Once a week; both semesters. One unit.* Dean THOMPSON

Courses for Graduates and Advanced Undergraduates

7. Railroad Finance.—*Three times a week; first semester.* Dr. LOCKLIN

8. Railroad Organization.—*Twice a week; first semester.* Mr. ORLAND

10. Railroad Rates.—*Three times a week; second semester.* Dr. LOCKLIN

16. Railroad Operation.—*Three times a week; second semester.* Mr. ORLAND

22. Ocean Shipping.—*Three times a week; first semester.* Professor LITMAN

26. Railroad Problems.—*Three times a week; second semester.* Dr. LOCKLIN

ZOOLOGY

At least sixteen semester hours of college work in zoology are required for entering on major graduate study in this subject. Under special circumstances advanced work in closely allied subjects may be accepted in lieu of the fourth semester's work in zoology. When zoology is chosen for a minor the courses listed for graduates and undergraduates must be preceded by at least one full year's undergraduate work in zoology.

For the prosecution of graduate study in zoology a reading knowledge of German and French is indispensable and familiarity with Latin and Greek is of great advantage.

Graduate students specializing in zoology are strongly advised to spend at least one summer in study at the seashore. Every candidate for the doctor's degree will be required to furnish evidence of having completed satisfactorily at least one eight-week period in such work at an approved location. To facilitate this plan an investigator's room has been provided at the Woods Hole Marine Biological Laboratory, where members of the department are offered

research facilities without cost to themselves. Application for the use of this room should be made to the head of the department early in the year. Similar facilities are sometimes afforded at other marine laboratories.

Students interested in the field of Genetics are referred especially to courses 115 and 124.

Courses for Graduates

102. Evolution of the Vertebrates.—*Twice a week; first semester. One-half unit.* Assistant Professor ADAMS

103. Cytology.—*Twice a week; second semester. One unit.* (Given in 1929-30 and alternate years). Associate Professor SHUMWAY

106. Topics in Vertebrate Embryology.—*Twice a week; second semester. One unit.* (Given in 1928-29 and alternate years). Associate Professor SHUMWAY

107. Parasitology.—*Once or twice a week; both semesters. One unit.* (Given in 1928-29 and in alternate years). Professor WARD

109. Physiological Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1928-29 and in alternate years). Professor SHELFORD

110. Economic Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1929-30 and in alternate years). Professor SHELFORD

111. Experimental and Field Ecology.—*Both semesters. One-half to two units.* Professor SHELFORD

115. Factors of Individual and Racial Development.—*Twice a week; both semesters. One unit.* Professor ZELENY

117. Faunistic Zoology.—Taxonomy and distribution, with especial reference to the local fauna. *Three times a week; first semester. One unit. Second semester. One-half to one unit.* Associate Professor VANCLEAVE

127. Theories of Animal Phylogeny.—Relations of various groups of animals; signification of so-called intermediate forms; invertebrate larval forms and theories of descent based on them. *Once or twice a week; both semesters. One unit.* (Given in 1929-30 and in alternate years). Professor WARD

Individual Research Courses

121. Invertebrate Morphology and Parasitology.—*One to two units.* Professor WARD

122. Vertebrate Morphology.—*One to two units.* Assistant Professor ADAMS

123. Faunistic and Systematic Zoology.—*One to two units.* Associate Professor VANCLEAVE

124. Experimental Zoology and Genetics.—*One to two units.* Professor ZELENY

125. Animal Ecology and Behavior.—*One to two units.*
Professor SHELFORD

126. Embryology and Cytology.—*One to two units.*
Associate Professor SHUMWAY

Courses for Graduates and Advanced Undergraduates

11. Experimental Ecology and Geography.—*Three or five times a week; first semester.* Professor SHELFORD

20a-20b. Current Investigations.—Must be taken by all graduate students majoring in Zoology. *Once a week; both semesters.* Members of the Department

21a-21b. Introduction to Zoological Research.—*Two to five times a week; both semesters.* Professor WARD

22-23. Morphology of Vertebrates.—*Two to four times a week; both semesters.* Assistant Professor ADAMS

63. Ontogeny of Vertebrates.—*Two or four times a week; first semester.*
Associate Professor SHUMWAY; ————

66. Comparative Vertebrate Embryology.—*Two or four times a week; second semester.* (Continuation of 63).
Associate Professor SHUMWAY; ————

INDEX

Accountancy, 22
Admission, 9
Agronomy, 23
Amount of work for master's degree, 12
Animal Husbandry, 24
Architecture, 26
Astronomy, 26

Bacteriology, 27
Biological laboratories, marine, 12
Board of Trustees, 2
Botany, 28
Business Law, 30
Business Organization and Operation, 30

Calendar, 5, 6
Ceramic Engineering, 31
Changes in study-lists, 10
Character of graduate work, 9
Character of masters' degrees, 12
Chemistry, 33-38
Civil Engineering, 38
Classics, 40
Contents, Table of, 3, 4
Credit, transfer of graduate, 12

Dairy Husbandry, 41
Degrees, application for, 13
  Doctor's, 15
  in August, 13
  Masters', 13
  Professional, in Engineering, 14
Deposit, for laboratory material, 21
  for printing thesis, 17
Diploma fee, 20
Doctor's degree, 15
  examination for, 16, 17
  in engineering, 17
  period of study, 16
  residence, 15
  work in other universities, 16
  special regulations, see name of department as Classics, History, etc.

Economics, 42
Education, 46
Electrical Engineering, 48
Engineering, doctor's degree in, 17
  Master's degree in, 14, 15
  Professional degree in, 14
  Architectural, 26
  Ceramic, 31
  Civil, 38
  Electrical, 48
  Mechanical, 66
  Mining, 68
  Railway, 76
English Language and Literature, 49
Entomology, 52
Examinations for doctor's degree, 16, 17
Executive Faculty, 7
Expenses, 20
  board, 21
  room, 21

Faculty, Executive, 7
Failures, 11
Fees, 20
Fellowships, 18
Final examination for doctor's degree, 16

Foreign language for master's degree, 13
French, 77

Genetics, 54
Geography, 56
Geology, 54
Germanic Languages and Literature, 56
Grades, 14
Graduate Club, 21
Greek, 40, 57

History, 57
  of Graduate School, 9
Home Economics, 61
Horticulture, 62

Incidental fee, 20
Italian, 78

Laboratories, marine biological, 12
Language and Literature, English, 49
  Germanic, 56
  Romance, 77
Language examination for doctor's degree, 16
  foreign, for master's, 13
Latin, 40
Libraries, 19
Library Science, 63
Listeners' courses, 10

Majors, 12, 15
Marine biological laboratories, 12
Master of Arts, degree of, 12
  See also special requirements of various departments, as Economics, Chemistry, etc.
Master of Science, degree of, 12
Master's degree in Engineering, 14
Mathematics, 64
Matriculation fee, 20
Mechanical Engineering, 66
Mechanics, Theoretical and Applied, 67
Medical Science, summer work in, 11
Meteorology, 68
Mineralogy, 68
Mining Engineering, 68
Minors, 12, 15
Miscellaneous courses, 10

Organization of Graduate School, 9

Philology, Romance, 79
Philosophy, 69
Physics, 70
Physiology, 73
Political Science, 73
Preliminary examinations for doctor's degree, 16
Professional degrees in Engineering, 14
Program of Study, 9
Psychology, 75
Public Speaking, 51

Railway Engineering, 76
Registration, 9
Residence study, 11, 15
Rhetoric, 51
Romance Languages and Literature, 77

Scandinavian Languages, 51
Scholarships, 18
Senior and graduate study, 10
Sociology, 79
Spanish, 78
Staff, students on, 11
Summer study, 11

Theoretical and Applied Mechanics, 67
Thesis, Doctor's, 17
  Master's, 13
  printing doctor's, 17
Thesis work on leave of absence, 13
Transfer of graduate credit, 12
Transportation, 81
Trustees, Board of, 2
Tuition, 20

Undergraduate courses open to graduate students, 10

Visitors, 10

Withdrawal, 11
Work done elsewhere, 11, 12, 16

Zoology, 81

THE GRADUATE SCHOOL

OF THE

UNIVERSITY OF ILLINOIS

Announcements for

1929-1930

PUBLISHED BY THE UNIVERSITY OF ILLINOIS
URBANA

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CONTENTS

PAGE

Board of Trustees 2
University Calendar 5, 6
Executive Faculty 7
History and Organization 9
Admission 9
Character of Graduate Work 9
Registration 9
  Residence 11
Masters' Degrees 12
  In Arts and Science 12
  In Engineering 14
The Doctor's Degree 15
  Period of Study 16
  Examinations 16
  Thesis 17
  In Engineering 17
Scholarships and Fellowships 18
Libraries 19
Fees and Expenses 20
Graduate Club 21

Departments of Instruction

Accountancy 22
Agronomy 23
Animal Husbandry 24
Architecture and Architectural Engineering 26
Astronomy 26
Bacteriology 27
Botany 28
Business Law 30
Business Organization and Operation 30
Ceramic Engineering 31
Chemistry 33
Civil Engineering 38
Classics 40
  Greek 40
  Latin 40
Dairy Husbandry 41
Economics 42
Education 46
Electrical Engineering 48
English 49
  Language and Literature 50
  Rhetoric 52
  Public Speaking 52
  The Scandinavian Languages 52

PAGE
Entomology 52
Farm Organization and Management 53
Genetics (See Zoology) 54
Geology 54
Germanic Languages and Literature 56
Greek (See Classics) 57
History 57
Home Economics 61
Horticulture 62
Library Science 63
Mathematics 64
Mechanical Engineering 66
Mechanics, Theoretical and Applied 66
Meteorology (See Geology) 67
Mineralogy (See Geology) 67
Mining Engineering 67
Philosophy 69
Physics 69
Physiology 72
Political Science 72
Psychology 74
Railway Engineering 76
Romance Languages and Literatures 76
French 77
Italian 78
Spanish 78
Romance Philology 79
Sociology 79
Transportation 81
Zoology 81
Index 85

GRADUATE SCHOOL CALENDAR

SUMMER SESSION

1929	
June 17, Mon.	Registration Day
June 18, Tues.	Summer Session begins
July 4, Thurs.	A legal holiday
July 27, Sat., 12 m.	Last day for candidates for degrees in August to deposit theses
Aug. 9, 10, Fri., Sat.	Final examinations

FIRST SEMESTER

1929	
Sept. 13, 14, Fri., Sat.	Registration Days
Sept. 23, Mon.	Last day for candidates for the degree of A.M. and M.S. in October to file applications for degrees and to deposit theses
Sept. 18, Wed., 8 a. m.	Instruction begins
Sept. 20, Fri.	Preliminary examination in French
Sept. 27, Fri.	Preliminary examination in German
Nov. 1, Fri.	Last day for candidates for degrees in June to announce thesis subjects
Nov. 4, Mon.	Last day for candidates for professional engineering degrees to file statements of professional study and experience
Nov. 27, Wed., 11 a.m.	Thanksgiving recess begins
Dec. 2, Mon., 1 p.m.	Instruction resumed
Dec. 21, Sat., 12 m.	Holiday recess begins
Dec. 31, Tues., 5 p.m.	Last day for candidates for professional engineering degrees to submit outlines of theses
1930	
Jan. 3, Fri., 8 a.m.	Holiday recess ends
Jan. 13, Mon.	Last day for filing applications for Masters' degrees to be conferred in February
Jan. 13, Mon.	Last day for candidates for the degree of Ph.D. in February to deposit theses
Jan. 18, Sat.	Preliminary examination in French
Jan. 21, Tues.	Semester examinations begin
Jan. 27, Mon.	Last day for candidates for the degrees of A.M. and M.S. in February to deposit theses
Jan. 29, Wed.	Semester examinations end
Feb. 1, Sat.	Preliminary examination in German

SECOND SEMESTER

Jan. 31, Feb. 1, Fri., Sat.	Registration days
Feb. 5, Wed., 8 a.m.	Instruction begins
Mar. 1, Sat.	Last day for applications for Scholarships and Fellowships for 1930-1931
Apr. 17, Thurs., 11 a.m.	Easter recess begins
Apr. 22, Tues., 1 p.m.	Easter recess ends
Apr. 25, Fri.	Preliminary examination in French
May 1, Thurs.	Last day for candidates for professional engineering degrees to deposit completed theses
May 1, Thurs.	Last day for filing applications for Masters' degrees to be conferred in June
May 2, Fri.	Preliminary examination in German
May 14, Wed.	Last day for candidates for the degree of Ph.D. in June to deposit theses
May 15, Thurs.	Last day for filing applications for Masters' degrees to be conferred in August[1]
May 26, Mon.	Semester examinations begin
May 28, Wed.	Last day for candidates for the degree of A.M. and M.S. in June to deposit theses
June 4, Wed.	Semester examinations end
June 11, Wed.	Fifty-ninth Annual Commencement

[1]The attention of students registered in the Summer Session only is called to page 13, Degrees in August.

THE EXECUTIVE FACULTY

David Kinley, Ph.D., LL.D., President of the University

Arthur Hill Daniels, Ph.D., *Professor of Philosophy and Dean of Graduate School*

Roger Adams, Ph.D., *Professor of Organic Chemistry*

Ernest Bernbaum, Ph.D., *Professor of English*

William Leonidas Burlison, Ph.D., *Professor of Crop Production*

Edward Herbert Cameron, Ph.D., *Professor of Educational Psychology*

Arthur Byron Coble, Ph.D., *Professor of Mathematics*

Maxwell Jay Dorsey, Ph.D., *Professor of Pomology*

Herbert Fisher Moore, M.M.E., D.Sc., *Research Professor of Engineering Materials*

Rexford Newcomb, A.M., M.Arch., A.I.A., *Professor of the History of Architecture*

William Abbott Oldfather, Ph.D., *Professor of Classics*

William Spence Robertson, Ph.D., *Professor of History*

Henry Perly Rusk, M.S., *Professor of Cattle Husbandry*

Fred Wilbur Tanner, Ph.D., *Professor of Bacteriology*

Arthur Cutts Willard, B.S., *Professor of Heating and Ventilation*

HISTORY AND ORGANIZATION

The University of Illinois offered facilities for advanced study and research in various lines as early as 1872. Organized graduate instruction, however, under the name of the Graduate School, was first undertaken in 1892. In 1894 the administration of the school was vested in the Council of Administration, and the Vice-President of the University became Dean of the School. In 1906 the Graduate School was organized as a separate faculty, consisting of a dean and members of the University faculty assigned to this duty by the President.

By action of the Trustees the teaching faculty of the Graduate School includes all members of the University faculty who give instruction in approved graduate courses. The affairs of the School, however, are in charge of the Executive Faculty appointed each year by the President.

ADMISSION

Admission to the Graduate School may be granted to graduates of institutions whose requirements for the bachelor's degree are substantially equivalent to those of the University of Illinois, and to applicants from other institutions approved by the Executive Faculty, as hereinafter provided. *Admission to the Graduate School does not, however, imply admission to candidacy for an advanced degree, and gives no right or claim to be so admitted. Such candidacy is determined by the faculty after the student has demonstrated by his work here, for from two to five months, that he has the ability to do major work of graduate character. A mere accumulation of "credits" or "grades" is not sufficient.*

Admission to graduate courses may be granted only to those who have had the requisite undergraduate work in those courses or departments. But a student of mature age who satisfies the Dean and the Department concerned of his ability to pursue graduate work in a given line may be enrolled in particular graduate courses, without reference to a degree, and permitted to carry on such study or investigation under the direction of a department of the University as the department shall recommend and the Dean approve.

Application blanks for admission may be secured from the Registrar of the University. Every applicant must submit with his application for admission an official transcript of his college record.

CHARACTER OF GRADUATE WORK

The principal aim of graduate study is the development of the power of independent work and the promotion of the spirit of research. Each candidate for a degree is expected to have a wide knowledge of his subject and of related fields of work; for the graduate student is not expected to get from lecture and laboratory courses all the knowledge and training necessary to meet the requirements for his degree.

REGISTRATION AND PROGRAM OF STUDY

The following regulations concerning registration and program of studies are laid out primarily for first-year students. Second-year and third-year graduate

students fill out their programs irrespective of the unit value of courses, according to their needs, under the advice of their instructors.

Registration.—Each graduate student must register at the beginning of each semester. The registration of a new student may be accepted at any time provided the student is prepared to take up courses actually under way. Credit towards the fulfillment of the residence requirement dates, however, from the time of registration and not from the beginning of the semester or year in which the student enters. Registration will not be permitted later in the year than April 1, except in the case of students who expect to continue through the summer session, or are returning to complete a year's work which has been interrupted by unavoidable circumstances. *No student is permitted to attend any University course in which he is not registered.*

A new student must fill out in duplicate an application for admission and submit it to the Registrar, from whom, after the approval of his application, he will receive a card of admission and a study-list which will give details of procedure in registering. He should fill out the study-list after consultation with his adviser, or the person in charge of his major work, and also with the instructors whose courses he wishes to elect. *Registration, including the payment of fees, must be completed by the close of the registration days of the Graduate School. Otherwise a fee of $5.00 for late registration will be charged all former students.*

Changes in Study-Lists.—A graduate student is expected to plan his work so carefully that changes in his study-list during the semester will not be necessary. When a change seems advisable, however, it may be permitted without fee if made within three weeks of the date of registration. After that date a fee of one dollar is charged for each change, except that the total charge for rearrangement authorized on any one change slip shall not exceed two dollars.

Advanced Undergraduate Courses Open to Graduate Students.—

1. *Courses not open to students below senior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as unit courses for graduate credit, or as half-unit courses when listed for less than four hours of undergraduate credit.

2. *Courses open to students of junior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as half-unit courses for graduate credit, or as quarter-unit courses when listed for two to three hours undergraduate credit. Courses to which sophomores are regularly admitted may not be taken for graduate credit, either major or minor.

Seniors and Graduate Study.—If at the beginning of the second semester of his senior year a student who has been in residence at least one year is within five hours of a bachelor's degree, he may be permitted to register for courses which may count for residence for a master's degree, provided his program does not require more than twelve formal class, lecture, or laboratory exercises a week, and is approved by the Dean at the time of registration.

Miscellaneous and Listeners' Courses.—Graduate students are permitted under proper circumstances to attend classes as listeners, and to elect miscellaneous subjects, that is, courses which do not count toward an advanced de-

gree. Listeners' cards may be obtained at the Dean's office. A graduate student in full standing and carrying a minimum program, may be permitted, under proper circumstances, to attend one class as a listener, or to elect one miscellaneous subject (that is, a course which does not count towards an advanced degree). No subject is open as a listener's or miscellaneous course unless it has a specific educational bearing on the student's major or minor subjects of study.

A student who elects a miscellaneous course is required to register in it, do the work, and pass the semester examinations, unless he is permitted to withdraw under the rules. A student who has a listener's card is not permitted to participate in the class work or the examination.

No student may register for a full minimum program of work for graduate credit if it is necessary for him to carry at the same time more than one miscellaneous subject and to visit one course.

Students on the Staff.—Assistants and others on the University staff who undertake to do graduate work are permitted to take an amount of work determined by the terms of their employment. Such a student, if required by his engagements to teach more than five classes a week or to have laboratory work or supervision exceeding ten hours a week, may not receive his master's degree at the end of one year, nor his doctor's degree at the end of three.

Residence and Work Done Elsewhere.—Continuous residence and study are required of all members of the Graduate School, unless they are granted leave of absence by the Dean, upon recommendation of the professor in charge of their work, for the purpose of carrying on elsewhere studies or investigation in the line of work for their degrees.

Graduate Study in the Summer.—Graduate students in the Summer Session are subject to the same scholastic requirements as those in the regular University year. Their study-lists must be approved by the Dean of the Graduate School, or his representative. Attendance during four out of six consecutive summer sessions, or one semester and two summer sessions, is considered the equivalent of one year in residence. The faculty is unwilling to accept summer-session work beyond the master's degree towards the doctor's degree, except in the case of a student who works in a summer session preceding or following a regular year's attendance at the University. In no case may the last year's work for the doctorate be done in disconnected summer sessions.

No course offered in the Summer Session may be taken for credit towards a higher degree unless it is described in the summer-session circular as accepted for that purpose.

Summer Work in Medical Sciences.—Graduate courses in medical sciences are offered in the summer quarter between June and September at the College of Medicine of the University of Illinois in Chicago. Circulars describing the courses offered and conditions of admission and work may be obtained from the Secretary of the College of Medicine, Congress and Honore Streets, Chicago.

Failures.—A graduate student who fails in any course in his major subject cannot secure his degree in the same year in which the failure occurred. No condition examinations are given graduate students.

Withdrawal.—If after registration a graduate student wishes to withdraw from any course or to add other work, he must first secure the necessary papers

from the Dean's office. See the regulations concerning changes in study-lists, page 10. If he wishes to withdraw from the University he must get clearance papers at the Dean's office.

DEGREES

Masters' Degrees

Character of Masters' Degrees.—The master's degree conferred depends upon the character of the bachelor's degree. The usual practice is that A.M. shall follow A.B., and that M.S. shall follow B.S. However, this practice may be departed from in cases where the undergraduate course of study of the candidate was of a kind for which some reputable institutions in this country give A.B., while others give B.S.

Amount of Work Required.—Candidates for the degree of Master of Arts or Master of Science are required to do at least one full year's work in residence, including a thesis. By this is meant from four to five unit courses each semester or their equivalent. A unit course is one which requires ten hours of time a week through one semester, or a minimum of 180 hours, irrespective of the mode of distribution of that time in class work, laboratory work, and private study. Four such courses or their equivalent constitute a full *minimum* program for one semester, and eight such courses, or their equivalent, constitute the *minimum formal* year's work accepted for a master's degree. Only first rate students are permitted to secure a degree with this minimum program.

Unless otherwise permitted, every student must take each semester at least one course open to graduate students only (courses numbered 100 and upwards).

In the first year of his graduate study each student is required to attend a minimum of four formal class, lecture, or laboratory exercises a week. In no case is he permitted during his course to attend more than twelve a week, without permission.

Work Done Elsewhere.—Members of the staff and high-school teachers residing and employed in Urbana or Champaign who have done graduate work in approved institutions elsewhere may secure credit not to exceed four units towards the master's degree by passing examinations in that work. They may complete the work for the degree by securing at least four units more while registered in the Graduate School for not less than one academic year.

Students in zoology who take work in a marine or fresh-water biological laboratory or station are permitted to offer not less than six weeks nor more than nine weeks of such work in partial fulfillment of the requirement for the master's degree.[1] This privilege is granted only when the work is done with the permission of the faculty (secured in advance), in an approved laboratory, and under instructors accepted by the faculty. Credit for such work may be secured by examination after the student has submitted an official certificate of attendance at the laboratory or station, together with a full written report of the work done there. No candidate for the master's degree may avail himself of this provision who is not registered in the Graduate School for one full academic year, during which he shall do the rest of the work necessary for his degree.

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[1]The experience at a marine laboratory which, as indicated above, is optional with the candidate for the master's degree, is required of all candidates for the doctorate in zoology.

Similar arrangements are made, under similar conditions, for students of geology in connection with Geological Surveys.

Majors and Minors.—A candidate for a master's degree may do all his work in one subject, or he may select a major and one minor, or a major and two minors. A major or minor denotes the field of knowledge of a department, or such part thereof as constitutes a separate and independent division of that field. For a master's degree a major is at least half the work, or a minimum of four units, for one year. Less than one unit may not be counted as satisfying the requirements of a minor without the approval of the department concerned.

Foreign Language.—The ability to use one or more of the modern languages ordinarily studied in the undergraduate curriculum is expected of all candidates for the master's degree, and in some lines of study is required. On this matter students should consult the heads of the departments in which their major subjects lie.

Masters' Theses.—Each candidate for a master's degree is required to present a thesis on some subject approved by the professor in charge of his major work and the Executive Faculty of the Graduate School. Such approval, except in case of students working for masters' degrees in summer sessions only, must be secured not later than the end of the sixth week of the year of residence.

Students working for masters' degrees exclusively in summer sessions must announce their thesis subjects not later than the beginning of their third session in residence. The requirement of a thesis may be waived, however, on the recommendation of the professor in charge of his major work and the approval of the Dean, *provided application to waive the thesis is made at the time for announcing thesis subjects.* A student excused from writing a thesis must replace it with additional courses of instruction.

No one will be excused from writing a thesis unless one-half of his program of studies consists of courses numbered 100 and upwards.

The thesis required from a candidate for a master's degree ordinarily will demand one-fourth of the student's time and may not exceed one-third of it. The thesis must be typewritten, on "thesis paper,"[1] and the title page must be printed. The thesis in its final form, together with a certificate of approval by the proper officer, must be left by the professor in charge at the Dean's office at least two weeks before the date on which the degree is to be conferred. No article prepared for another use, or previously published, will be accepted as a thesis.

Applications for Degrees.—Each candidate for the degree of Master of Arts or Master of Science shall file an application for the degree on a blank provided for the purpose, to be had at the Dean's office. For the dates of applications and of deposition of theses, consult the calendar at the beginning of the bulletin.

Degrees in August.—Students who expect to become candidates for the master's degree in August may be recommended at the June meeting of the Senate subject to the successful completion of the work for which they are to register in the Summer Session. However, in order to avail themselves of this privilege, students must file with the Dean before the June meeting of the

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[1]No other will be accepted by the Dean. "Instructions for the Preparation of Theses" may be obtained at the Dean's office.

Senate an exact statement of the work necessary to complete the requirements for the degree. Blanks for this purpose may be secured at the Dean's office.

Thesis Work on Leave of Absence.—Under proper conditions a student may be permitted to complete the last fourth of his work, if devoted to his thesis, under leave of absence for a period not to exceed the equivalent of two semesters. To get such permission the student must have secured credit for at least six units; must petition for the privilege; must submit to the Dean an outline of the proposed investigation, approved by the professor in charge of his major work, and must submit satisfactory evidence that adequate facilities are available to him at the place where he intends to do the proposed work. Approval on all these points must be obtained one collegiate year before the thesis is due. Immediately following approval the student must register and pay an incidental fee of $20.00.

Grades.—Students' work is graded in five classes, A, B, C, D, and E. The last indicates a failure. D indicates unsatisfactory, though passable work.

A student who receives two units of a grade below B during his first year of graduate work may not complete the first year of residence by carrying the minimum program of eight units for the master's degree. Three units of a grade below B disqualify a student as a candidate for a degree.

A failure or absence from examination in any course or failure in any other examination prescribed by the department of the major may prevent the conferring of the degree; and, as already indicated, failure in any course in the major field precludes the conferring of the degree in the same year.

Second Degrees in Engineering

Two classes of second degrees are open to graduates of the College of Engineering, namely, academic and professional.

The academic second degree in engineering is Master of Science, following Bachelor of Science, in architecture, architectural engineering, civil engineering, electrical engineering, etc. This degree is conferred in accordance with the regulations described above for *academic work in residence only.*

The *professional* second degrees in engineering are as follows:

Master of Architecture, after B.S. in architecture.

Architectural Engineer, after B.S. in architectural engineering.

Ceramic Engineer, after B.S. in ceramic engineering.

Civil Engineer, after B.S. in civil engineering or in railway civil engineering.

Electrical Engineer, after B.S. in electrical engineering or in railway electrical engineering.

Mechanical Engineer, after B.S. in mechanical engineering or in railway mechanical engineering.

Engineer of Mines, after B.S. in mining engineering.

Professional degrees in engineering may be conferred on two classes of candidates: (1) those who have received an academic degree in engineering from the University of Illinois; (2) those who have received an academic degree in engineering from other institutions of equal standing and who have been members of the teaching or research staff of the College of Engineering or Engineering Experiment Station of the University of Illinois for at least three years prior to the conferring of the professional degree.

A candidate declares his candidacy by filing with the Dean of the College of Engineering, as chairman of the committee in charge, a detailed statement

covering his professional engineering experience. This statement must be made upon a standard form supplied by the Dean of the College of Engineering, as chairman of the committee in charge, and must be filed not later than the first Monday in November preceding the commencement at which the candidate expects to receive the degree. No statement of experience will be considered by the committee which does not show that the candidate has had a minimum of four years of acceptable engineering experience after receiving the degree of Bachelor of Science, and that for at least three years he has been in responsible charge of engineering work. Responsible charge in engineering teaching may be considered as responsible charge of work. In determining the acceptability of the engineering experience of the candidate the committee will be guided by the character of his professional work and the degree of responsibility involved, and will take into consideration such evidences of professional ability and growth as may be shown by his investigation of engineering problems, his contributions to technical literature and his membership and activity in engineering societies.

If the professional experience of the candidate is accepted he must submit for approval, prior to December 31, an outline of his proposed thesis. The completed thesis, in the form prescribed in the "Instructions for the Preparation of Masters' and Doctors' Theses," must be deposited with the Dean of the College of Engineering not later than May 1. The candidate must present himself at commencement in order to receive the degree.

A candidate for a professional engineering degree must pay the incidental fee of fifty dollars on being notified that his professional experience is accepted as qualifying him to enter as a candidate for the degree. No one will be enrolled as a candidate for the degree at the following commencement who does not pay his fee at this time. When a candidate for a professional engineering degree has once been accepted and paid his fee, he is eligible to receive the degree at any time within five years, without additional fee, on completion of the requirements; provided, however, that unless he completes the requirements within two years his name will be dropped from the list of candidates and in order to receive the degree within the five-year period he must register once more.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Major and Minor Subjects.—A member of the Graduate School who desires to become a candidate for the degree of Doctor of Philosophy is required to pursue a major subject in the department in which his research lies. He is also required to choose one minor subject, or he may choose two. If one minor only is chosen it must be taken in a department of study other than that of the major, and credit for it may be earned by work representing not less than four units, or one-sixth of the total residence required for the doctorate. If two minors are chosen, one must be a subject closely related to the major. With the approval of the adviser it may be a division of the major field of study. If the second minor is outside the department of major study, it may be satisfied by work representing not less than two units or one-fourth of a year of residence.

Except by special permission of the Dean the preliminary examination in major and minor subjects may not be taken until the minor work has been done.

Method of Computing Residence.—Credit for a full year of graduate work means that the student has during that time devoted all his working time and

energy to study of a graduate grade. After the first year of residence credit is not recorded in units, and there is no fixed correspondence between credit and courses as in undergraduate work. Thus it is possible for a second-year student to devote all his time to one course and his research; and for a third-year student to devote all his time to his research alone.

Period of Study.—The *minimum* period of study required for securing the degree of Doctor of Philosophy is three years, during which the student is required to devote all his working time to his studies. All three years must be spent in resident graduate study at some accredited educational institution and either the first two or the last one of the three must be spent at the University of Illinois. The degree is conferred, however, not for residence during a certain period, but for scholarly attainments and power of investigation, as proved by a thesis and examinations.

Work Done in Other Universities.—Credit for graduate work done in other universities is not "transferred." However, it may be accepted on examination as equivalent to resident work at the University of Illinois, provided the institution in which it was done is of high standing.

Examinations

Preliminary.—A. In major and minors.—Towards the end of his second year of study, or by special permission, at the beginning of his third year (not later than the first Saturday in October), the candidate for the degree must submit to a preliminary examination, in order to determine whether he will be accepted as a candidate for the degree in the following year. This examination is intended to test the student's knowledge of the fields of his major and minor subjects of study only. It is partly oral, and may be wholly so.

The student will not be admitted to his preliminary examination until the faculty is satisfied that he has finished substantially the equivalent of two years' graduate work. He must do a full year's graduate work between his preliminary examination and the completion of his work for the doctorate.

B. In Languages.—The candidate will be required to demonstrate his ability to read French and German and other languages needed in his work. This test of proficiency in the use of French and German must be passed before the student is admitted to the preliminary examination in major and minor subjects. For the dates of these language examinations consult the calendar at the beginning of this bulletin.

Application for admission to these examinations must be made a week, at least, in advance of the date of the examination.

Final Examination.—At least two weeks before the time when the degree is conferred, the candidate must submit to a final examination, given by a committee appointed by the Dean. This examination is primarily on the research work of the student, as embodied in his thesis, but it is not confined to that. It extends to the whole field of study of the candidate. It will not be confined to the courses which the candidate has attended in the University of Illinois only, if he has done part of the work elsewhere; nor even to the field covered by the courses specifically taken in this or other universities; but will be so conducted as to determine whether the candidate has a satisfactory grasp of his major subject as a whole, and a general acquaintance with the fields of knowledge represented by his course of study.

The final examination may not be divided. The examination must be taken all at one time even tho it requires several sessions.

If after having passed his preliminary examination, he fails in the third year of his study to meet the expectations of the professors in charge of his work, or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

Other Examinations.—Before the candidate is admitted to the final examination and the defense of his thesis, he may be required to take any other examination, oral or written, that is thought proper by the various departments in which he has studied.

The above examinations are in addition to those in the courses for which the student is registered. These must be taken at the time for which they are set in the examination schedule.

Thesis.—The power of independent research must be shown by the production of a thesis on some topic connected with the major subject of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or as many of them as may wish to question him about it, in connection with his final examination.

The subject of the thesis should be chosen not later than the end of the second year of residence and must be submitted for formal approval by the faculty not later than six weeks from the beginning of his third year of residence.

A typewritten copy of the complete thesis, *on thesis paper,*[1] and in final form must be deposited in the office of the Dean for presentation to the examining committee not later than two weeks prior to the final examination and not less than four weeks before the time when the degree is conferred. At the same time, the candidate must deposit with the Dean a manuscript of the essential part, or an abstract, or a digest of his thesis, in condition for publication at a cost not to exceed seventy-five dollars ($75). The manuscript must be sufficient to show the method followed, the evidence used and the conclusions reached in the investigation, and must bear the approval of the department and the Executive Faculty of the Graduate School.

The candidate must pay to the Comptroller before graduation the sum of seventy-five dollars ($75) out of which the University will print at least one hundred copies of this manuscript for circulation by the University, unless the thesis entire or in abbreviated form is published by the author or is accepted for publication by a standard journal or publisher within a year from the date of graduation. In the latter event, and after one hundred copies have been presented to the University by the writer, the cash deposit shall be returned to him.

The typewritten and printed forms of the thesis must comply with the regulations given in "instructions for the preparation of masters' and doctors' theses," copies of which may be obtained at the Dean's office.

Doctor's Degree in Engineering.—The degree of Doctor of Philosophy in Engineering is offered in certain lines of academic work of a high scholastic type in engineering science for students who wish to prepare themselves as teachers, investigators, and experts.

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[1]No other will be accepted by the Dean.

The general requirements for this degree, as to preliminary education, linguistic attainments, etc., are the same as in other lines.

The following lines of engineering science, or others approved by the Graduate School, may be elected as majors:

Engineering mechanics
Steam engineering
Hydraulic and sanitary engineering
Electrical engineering
Heating and ventilation engineering
Railway engineering
Masonry construction and structural engineering
Coal-mining engineering
Ceramic engineering

The first minor may be any of the above or one of the following sciences or an authorized combination of two of them:

Theoretical mechanics
Mathematics
Thermodynamics
Bacteriology
Chemistry
Geology
Physics (Experimental or mathematical)
Zoology
Botany
Economics

The second minor should be in other than engineering subjects.

SCHOLARSHIPS AND FELLOWSHIPS

A number of scholarships and fellowships have been established by the Trustees of the University. To first-year graduate students of ability and promise, there are open a number of scholarships with a stipend of $300 each and freedom from tuition, incidental, and laboratory fees.[1] To second-year and third-year graduate students, that is, those who have had one or two years of graduate study, there are open fellowships with stipends of $400 and $500, with freedom from the above-mentioned fees. The larger stipends are given only to students who are expected to take their degrees within the year. Each holder of a fellowship or scholarship must pay the matriculation fee of ten dollars, unless he holds a first degree from the University of Illinois, and also the diploma fee of ten dollars on receiving his diploma.

Candidates for these scholarships and fellowships must be graduates of the University of Illinois, or of colleges or universities having equivalent requirements for bachelors' degrees.

Application must be made on blanks to be obtained from the Dean of the Graduate School. These application forms should be sent to the Dean of the Graduate School as early as possible in February of the academic year preceding that for which the fellowship is desired. No application will be considered if received later than March first, until after April fifteenth, the date

[1]Up to a certain amount.

when appointees from the first list of applications must accept or refuse their appointments.

Persons appointed are notified on April first and must send the Secretary of the Board of Trustees notice of their acceptance or refusal by April fifteenth; and must agree that, if accepted, the appointment will not be resigned to take a similar one in any other institution during the year for which it is awarded.

Nominations to fellowships are made on the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself. Scholarships and fellowships are not given to candidates who are over thirty years of age at the time when the appointment is to be made.

For second-year fellowships, adequate preparation in French or German, and for third-year fellowships, adequate preparation in both French and German is required.

An appointment as honorary fellow, without stipend, may be made as specified for paid fellowships in the case of any one who has shown distinguished merit in his work.

LIBRARIES

The general University library, the library of the State Natural History Survey, and that of the State Geological Survey are all at the University in Urbana. The libraries of the School of Pharmacy and the College of Medicine are in Chicago.

These libraries contain about 760,000 volumes, and about 175,000 pamphlets. Of these 725,000 books and 165,333 pamphlets are in the libraries at Urbana; the rest are in Chicago. The library at Urbana also contains 3,050 maps and 7,900 pieces of sheet music. The departments at Urbana currently receive about 6,000 serials, while the College of Medicine and School of Pharmacy in Chicago receive 250.

The general library of the University is open daily, from 8 a. m. until 10 p. m. and on Sunday from 2:30 p. m. until 5:30 p. m.

A number of departmental and college libraries and reading rooms are maintained in various buildings on the campus; these libraries do not necessarily contain all the books in the respective subjects. In some instances they are primarily for the use of the graduate students and advanced undergraduate students in the departments using the respective buildings. The principal departmental libraries and reading rooms are the following:

Name of Library	*Location*	*Estimated number of volumes*
Philosophy, Psychology, and Education	Lincoln Hall	16,000
Classics	Lincoln Hall	23,600
Modern Languages	Lincoln Hall	27,000
English	Library Building	12,000
History and Political Science	Library Building	20,100
Economics and Sociology	Library Building	20,000
Natural History	Natural History Hall	23,000
Law	Law Building	36,000
Commerce Reading Room	Library Building	2,800
Architecture, Ricker Library of	Architecture Building	5,800
Agriculture Reading Room	New Agriculture Building	12,000
Chemistry	Chemistry Building	11,000
Physics	Physics Building	1,600
Mathematics	Mathematics Building	6,100
Engineering	Engineering Hall	9,800

The Dittenberger Classical Library.—The University possesses the library of Wilhelm Dittenberger, at one time Professor of Classical Philology in the

University of Halle. This library contains 5,600 items. It includes the works of the poets and prose writers, numerous works on grammar and history of literature, and between four and five thousand dissertations and programs on special topics. There are also many works dealing with other departments of classical philology, as epigraphy, history of ancient peoples, archeology, philosophy, history of art, geography, chronology, metrics, etc.

The Heyne Library of Germanics.—The library of Professor Moritz Heyne of the University of Göttingen was bought by the University. It contains about 5,200 volumes. The collection is rich in the general field of German philology and in lexicography. It has many rare first editions of works of German literature from the sixteenth, seventeenth, and eighteenth centuries and has sets of a number of rare periodicals.

The Gröber Library in Romance Languages.—The University also possesses the library of Professor Gröber of the University of Strassburg. This library contains about 6,500 titles.

The Vahlen Library, of the late Johannes Vahlen, contains about 10,000 volumes and is in itself an excellent working library in classical philological literature. It is well supplied with texts of Greek and Latin authors.

The Aron Library, collected by the late teacher and student of pedagogy, R. Aron, contains about 20,000 volumes. It is a scholarly collection of educational documents, among them many original and early editions, and furnishes first-hand material for the study of educational movements in Europe, especially in Germany, from the time of Luther and Comenius to the present. The collection of German "Fibeln" or school readers is unique, and the material for the history of juvenile songs and literature, the set of 17th and 18th century atlases, and the collection of rare hymn books and juvenilia make the collection very useful to students of education.

The Cavagna Library.—The library of the late Count Antonio Cavagna Sanigiuliani di Gualdana has been bought by the University. It is estimated that the library contains about 40,000 volumes, besides many maps, manuscripts, and prints, making a notable collection for the study of Italian history, literature, and art.

FEES AND EXPENSES

Except as noted below, graduate students pay fees as follows:

Matriculation fee	$10.00
Incidental fee, each semester, for residents of Illinois	25.00
All students, not residents of Illinois, pay, each semester an incidental fee of	37.50
Incidental fee for students registered for thesis work towards the master's degree on leave of absence	20.00
Diploma fee	10.00
For late registration	5.00
For change in study-list	1.00

All graduate students who have not matriculated as undergraduates at the University of Illinois pay the matriculation fee on entrance.

All graduate students pay the diploma fee.

No tuition or incidental fee is charged for graduate courses to scholars, fellows, or members of the corps of instruction or the staffs of the University libraries or of the scientific bureaus or experiment stations, who are appointed by the Board of Trustees, nor for undergraduate courses on their study-lists if approved by the heads of the departments and by the Dean of the School as necessary or desirable for the proper completion of the work for the degree. Otherwise graduate students who take undergraduate courses must pay the proper undergraduate fee.

Each student working in the laboratories, or in the drafting or engineering classes, is required to pay a fee of from 50 cents to $15.00 in each course for chemicals and apparatus used, and for any breakage or damage. But no charges or deposits for laboratory materials are required from scholars, fellows, or members of the corps of instruction or scientific staffs mentioned above, except when breakage or consumption of materials exceeds a certain allowance.

Table board may be obtained at prices ranging from $7 a week.

Room rent, single room, ranges from $20 a month; double room, $12.50 a month, each person.

THE GRADUATE CLUB

The Graduate Club is an unofficial organization of the graduate students and faculty. Its purpose is to furnish an opportunity for those working in different departments to become acquainted with one another and thus counteract the tendency toward narrowness which intense specialization may sometimes induce.

DEPARTMENTS OF INSTRUCTION

Courses open to graduate students are of two classes. The first class is wholly of graduate grade, and the courses are numbered 100 upwards. The second class includes the courses classified as for graduates and advanced undergraduates. These carry numbers below 100. The courses numbered 100 and upwards are all accepted for major credit. Those of the other group are in many cases accepted for minor credit only. This is especially true of courses which are open to juniors.

All courses have certain prerequisites for admission. Inasmuch as the prerequisite preparation may be gained at other institutions from courses differing from those offering a similar preparation at the University of Illinois, so that a statement of prerequisites as given here would not be understood elsewhere, their description is omitted altogether. However, a student who wishes to enter a particular course must satisfy the department concerned that he has had in some form the prerequisites for admission to the course.

For the convenience of first-year students the credit value of graduate courses is given in units. These values have no significance for second-year and third-year students.

The credit received for "courses for graduates and advanced undergraduates" is in accordance with the regulations of the Graduate School (see page 10).

Students are admitted to graduate standing in agriculture who have had a thoro training in the sciences underlying agriculture, and who are otherwise eligible to the Graduate School, even tho their undergraduate course of study lacked to some extent the amount and kind of technical work in agriculture included in the course of study for the bachelor's degree in agriculture at the University of Illinois.

ACCOUNTANCY

A student may major in accountancy for the master's degree only. The courses may be taken for minor credit by applicants for the master's or doctor's degree in other departments with the approval of the adviser. The courses in accountancy for graduates only may be selected by those who have had approximately 15 university credits in accountancy, including Accountancy 3a or its equivalent. Accountancy 4a is a prerequisite for 104; 3b for 110; 13 for 113; and 20 for 120.

The courses for graduates and advanced undergraduates may be taken by those who have had the equivalent of 12 university credits in accountancy.

Courses for Graduates

103. Advanced Theory and History.—*Twice a week; both semesters. One unit.* Associate Professor LITTLETON

104. Accounting Systems.—*Twice a week; both semesters. One unit.* Professor SCOVILL

110. Accounting Reports.—*Twice a week; second semester. One unit.* Professor FILBEY

113. Governmental Accounting.—*Twice a week; second semester. One unit.*
Professor Morey

120. Income Tax Development.—*Twice a week; first semester. One unit.*
Professor Filbey

129. Thesis.—*Once a week; both semesters. One unit.*
Professor Filbey and members of the staff

Courses for Graduates and Advanced Undergraduates

3a. Advanced Accounting.—*Three times a week; either semester.*
Professors Filbey, Scovill, Associate Professor Littleton

3b. Auditing.—*Three times a week; either semester.*
Professors Filbey, Scovill, Associate Professor Littleton

4a. Cost Accounting.—*Twice a week; either semester.*
Associate Professor Schlatter

4b. Accounting Systems.—*Twice a week either semester.*
Assistant Professor Baily

5a-5b. C. P. A. Problems.—*Three times a week; both semesters.*
Professor Scovill

13. Governmental Accounting.—*Twice a week; either semester.*
Professor Morey

20. Income Tax Procedure.—*Twice a week; second semester.*
Professor Filbey

30. Budgets and Accounting Control.—*Three times a week; either semester.*
Assistant Professor Theiss

AGRONOMY

The prerequisites for graduate work for a minor in Agronomy are Agronomy 25, 8, and 28, or the equivalent; and for a major in agronomy, six additional hours selected from Agronomy 7, 10, 11, 13, and 22, or the equivalent. The student with unusually good training in science may be permitted by the department to waive certain of the above-mentioned requirements.

Graduate students may specialize in soil fertility, soil physics, soil biology, plant breeding, or crop production.

Courses for Graduates

101. Soil Investigation.—*Twice a week; first semester. One unit.*
Professor DeTurk

104. Seminar in Agronomy.—*Once a week; both semesters. One-fourth unit.*
Heads of Divisions

111. Soil Biology.—*Once a week; first semester. One-half to one unit.*
Professor DeTurk

112. Plant Breeding.—*Three times a week; second semester. One unit.*
Associate Professor WOODWORTH

114. Crop Production.—*Twice a week; both semesters. One unit.*
Assistant Professor DUNGAN, Professor BURLISON

118. Investigation.—A special problem is chosen by each student. Graduate students taking a thesis should so indicate in registering in Agronomy 118. *Both semesters. One-half to four units.* Professors BURLISON, DETURK, R. S. SMITH, Associate Professor WOODWORTH, Assistant Professor DUNGAN

119. Experiment Station Problems.—See Animal Husbandry 103.
Professor MUMFORD

Courses for Graduates and Advanced Undergraduates

7. Farm Crops.—*Three times a week; second semester.*
Assistant Professor DUNGAN, Professor BURLISON

10. Soil Physics.—*Lectures twice a week; laboratory once a week; second semester.* Professor R. S. SMITH

11. Soil Biology.—Lectures, laboratory, assigned reading. *Three times a week; second semester.* Assistant Professor SEARS

13. Soil Fertility.—Lectures, laboratory, assigned reading. Three times a *week; first semester.* Assistant Professor SEARS

22. Plant Breeding.—*Three times a week; first semester.*
Associate Professor WOODWORTH

29. Field Plot Technic.—Purpose, methods, principles of field experimentation; interpretation of results. Lectures, discussions, and problems. *Three times a week; second semester.* Associate Professor WOODWORTH

ANIMAL HUSBANDRY

Students entering graduate work in animal husbandry must have had a thoro training in the fundamental principles of the subject either in connection with or in addition to a course of study in agriculture substantially equivalent to that offered in this University.

Students desiring to specialize in animal breeding are referred to the Zoology Department for other courses in related subjects.

Courses for Graduates

103. Experiment Station Problems.—Organization and administration of research; objects, methods, and the sources of error in experimental work. Open to graduate students in all the departments of the College of Agriculture. *Once a week; second semester. One-half unit.* Professor MUMFORD

110. Animal Nutrition.—Biochemistry, digestion, metabolism, and nutritive value of proteins. *Twice a week; both semesters. One-half unit.*
Professor GRINDLEY

112. Research.—Investigations along the following lines:

(a) Economic factors involved in meat production. Professor Rusk

(b) Systems of livestock farming. Associate Professor Case

(d) Animal nutrition. The chemistry of feeding stuffs; metabolism experiments and biochemical studies connected with the nutrition of farm animals. Professor Mitchell

(e) Animal breeding. Individual research course. Associate Professor Roberts

(f) Problems in poultry husbandry. Professor Card

One to three times a week; both semesters. One-half to two units. These courses may be taken during the summer by special permission.

117. Animal Breeding.—*Two to three times a week; both semesters. One unit.* Associate Professor Roberts

118. Animal Nutrition Seminar.—A review of current literature in animal nutrition. *Two hours a week; both semesters. One-half unit.* Professor Mitchell

119. Laboratory Methods in Animal Nutrition.—*Two to five times a week; both semesters. One-half to one unit.* Professor Mitchell

120. Laboratory Methods in the Diagnosis of Animal Diseases.—*Two to five times a week; both semesters. One-half to one unit.* Professor Graham

121. Laboratory Methods in Animal Breeding.—*Two to five times a week; both semesters. One-half to one unit.* Associate Professor Roberts

Courses for Graduates and Advanced Undergraduates

7. Principles of Animal Nutrition.—*Five times a week; first semester.* Professor Mitchell

10. Meat.—*Three times a week; second semester.* Associate Professor Bull

22. Advanced Stock Judging.—*Five times a week; first semester.* Members of the department

24. Meat.—*Once a week; first semester.* Associate Professor Bull

26. Pork Production.—*Three times a week; first semester.* Professor Carroll

27. Sheep Husbandry.—*Twice a week; second semester.* Assistant Professor Kammlade

28. History of Breeds of Live Stock.—*Three times a week; second semester.* Professor Edmonds and other members of department

29. Systems of Live Stock Farming.—*Twice a week; second semester.* Associate Professor Case

31. Advanced Course in Animal Nutrition.—*Three times a week; second semester.* Professor MITCHELL

32. Marketing Live Stock.—The class will visit a terminal live stock market; estimated cost of the trip, $12. *Twice a week; second semester.* Assistant Professor ASHBY

39. Poultry Production.—*Three times a week; second semester.* Professor CARD

40. Economics of Poultry Keeping.—*Three times a week; first semester.* Professor CARD

41. Animal Breeding.—*Three times a week; second semester.* Associate Professor ROBERTS

ARCHITECTURE AND ARCHITECTURAL ENGINEERING

The prerequisite for graduate work in architecture and architectural engineering is the equivalent of the undergraduate courses required at the University of Illinois for the degree of Bachelor of Science in architecture and architectural engineering in the branches of the subjects in which registration is desired.

Courses for Graduates

101. Architectural Construction.—*Twice a week; both semesters. One-half to one unit.* Professor PROVINE

103. Advanced Architectural Graphics.—*Twice a week; both semesters. One to two units.* Professor PROVINE, Associate Professor PALMER

104. Architectural Design.—*Twice a week; both semesters. One to four units.* Professor DILLENBACK

105. Architectural Practice.—*Twice a week; first semester. One-fourth to one-half unit.* Professor PROVINE

106. Architectural History.—Special research. *Twice a week; both semesters. Time to be arranged. One-half to two units.* Professor NEWCOMB

ASTRONOMY

The prerequisites for graduate study in astronomy are mathematics through calculus, a year's course in observational astronomy, and a course in college physics.

Courses for Graduates

101. Seminar.—*Three times a week; both semesters. One unit.* Professor BAKER

102. Stellar Astronomy.—*Three times a week; both semesters. One unit.* Professor BAKER

Courses for Graduates and Advanced Undergraduates

7. Celestial Mechanics.—*Three times a week; second semester.*
Professor BAKER

9. Astrophysics.—*Three times a week; first semester.* Professor BAKER

14. Observational Astronomy.—*Three times a week; both semesters.*
Professor BAKER

15. Geodetic Astronomy.—*Three times a week; second semester.*
Professor BAKER

BACTERIOLOGY

Students electing bacteriology as a major study must have had at least 10 semester hours of bacteriology and 15 semester hours of some other physical or biological science. Before receiving a degree a student must have had work equivalent to courses 5a, 5b, or 20, 8, 26, 103, and 107; candidates for the doctor's degree will be held responsible for a general knowledge of the subject as applied to plant pathology, dairy husbandry (dairy bacteriology), and soil biology. Courses in these subjects are listed under their respective departments and will be counted, after conference with adviser, toward the requirements for the doctor's degree.

Candidates for the doctor's degree with a major study in some other field than bacteriology, who elect a first or second minor in bacteriology, must offer a minimum of three units for the first minor and two and one-half units for the second minor selected from the courses offered in this department, or, for satisfactory reasons, certain courses in the departments mentioned above. Some of these courses must be strictly graduate courses. Course 103 is required of candidates for the doctor's degree whether bacteriology is a major or minor study.

Courses for Graduates

103. Physiology of Bacteria.—*Twice a week; first semester. One unit.*
Professor TANNER

107. Research.—For those students who are taking a major in bacteriology either for the doctor's degree or master's degree. *Both semesters. One-half to four units.* Professor TANNER

118a-118b. Current Literature.—Required of all graduate students majoring in bacteriology. *Once a week; both semesters. One-fourth unit.*
Professor TANNER

The attention of students is called also to courses in bacteriology offered in other departments. Certain of these courses must be elected toward requirements for advanced degrees after conference with adviser.

Courses for Graduates and Advanced Undergraduates

8. Applied Bacteriology.—Water, sewage, and food bacteria. *Five times a week; second semester.* Professor TANNER and Dr. WALLACE

10. Epidemiology.—*Twice a week; first semester.* Dr. WALLACE

20. **General Bacteriology.**—For seniors and graduate students. *Five times a week; both semesters.* Professor TANNER

26. **Pathological Bacteriology.**—*Three times a week; first semester.* Professor TANNER and Dr. WALLACE

BOTANY

Candidates for advanced degrees in Botany must offer for admission at least 20 hours in botany, or 15 hours in botany and 5 hours in a related subject acceptable to the department. Graduate students who desire to elect botany for minor credit must offer 15 hours of botany or 10 hours of botany and 5 hours in a related subject acceptable to the department.

The department wishes to call the attention of graduate students to courses in agronomy and soils, bacteriology, chemistry, entomology, geography, geology, horticulture, mathematics, physics, physiology, and zoology which are available to advanced students and offer a broad foundation for the different phases of botanical work. The practical work in plant sciences in the College of Agriculture and the Experiment station offers unusual facilities to the graduate student. Joint majors may be arranged in botany and agronomy.

Courses for Graduates

110. **Botanical Discussions.**—Required of all students and of members of the instructional staff. *Once a week; both semesters.* No credit.

113. **Discussions in Physiology.**—*Once a week; both semesters. One-fourth unit.* Professor HOTTES

115. **Discussions in Vegetation and Environment, and Plant Geography.**—*Once a week; both semesters. One-fourth unit.* Professor ————

117. **Discussions in Pathology and Mycology.**—*Once a week; both semesters. One-fourth unit.* Professor STEVENS

118. **Discussions in Ecology.**—*Once a week; both semesters. One-fourth unit.* Assistant Professor ————

Research Courses

130. **Physiology.**—*Once or twice a week; both semesters. One-half to two units.* (Botany 113 to be taken concurrently.) Professor HOTTES

150. **Vegetation and Environment.**—*Once or twice a week; both semesters. One-half to two units.* (Botany 115 to be taken concurrently.) Assistant Professor ————

155. **Plant Geography.**—*Once or twice a week; both semesters. One-half to two units.* (Botany 115 to be taken concurrently.) Professor ————

170. **Pathology.**—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor STEVENS

177. Mycology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor Stevens

180. Ecology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 118 to be taken concurrently.) Assistant Professor ————

Courses for Graduates and Advanced Undergraduates

30. Physiology.—Discussions and experiments on growth, and the effect of environment on growth. *Once or twice a week; first semester.*
Professor Hottes and assistant

33. Physiology.—Discussions and experiments on respiration, and the effects of the environment and food on energy release. *Once or twice a week; first semester.* Professor Hottes and assistant

40. Algae.—Morphology and classification. *Once or twice a week; second semester.* (Given in 1930-31 and in alternate years.) Dr. Hague

41. Bryophytes.—Morphology and classification. *Once or twice a week; first semester.* (Given in 1930-31 and in alternate years.) Dr. Hague

42. Fungi.—General morphology and taxonomy. *Once or twice a week; second semester.* Professor Stevens

43. Pteridophytes.—Comparative morphology. *Once or twice a week; first semester.* (Given in 1929-30 and in alternate years.) Dr. Hague

44. Spermatophytes.—Comparative morphology. *Once or twice a week; second semester.* (Given in 1929-30 and in alternate years.) Dr. Hague

45. Cytology and Anatomy.—The structure and function of the cell and its organs, plant anatomy and histology. *Once or twice a week; second semester.* (Given in 1930-31 and in alternate years.) Professor Hottes and assistant

46. Heredity and Evolution.—The cell in inheritance; environment, adaptation, and evolution. *Once or twice a week; first semester.* (Given in 1929-30 and in alternate years.) Professor Hottes and assistant

50. Vegetation and Environment.—Classification and recognition of plant communities. Methods of measuring the factors of the habitat and the response of vegetation to direct and indirect factors. *Once or twice a week; first semester.*
Professor ————

60. Systematic Botany.—Phylogenetic study of ferns and flowering plants. Relationship of the principal orders and families, rules of taxonomy and the identification of species. *Once or twice a week; second semester.* Mr. Bogusch

70. Taxonomy of Pathogenic Fungi.—Myxomycetes, Bacteria, Phycomycetes and Ascomycetes. *Once or twice a week; first semester.* Professor Stevens

77. Taxonomy of Pathogenic Fungi.—Basidiomycetes and Fungi Imperfecti. *Once or twice a week; second semester.* Professor STEVENS

78. Morbid Histology.—Studies in the mode of entrance of the pathogen and of the histological changes induced. *Once or twice a week; first semester.* (Given in 1929-30 and alternate years.) Professor STEVENS

79. Methods in Pathology.—A general survey of the special methods used in Plant Pathology. *Once a week; second semester.* (Given in 1930-31 and alternate years.) Professor STEVENS

80. Ecology.—Symbiosis; the interrelationship of plants and the living environment. *Once or twice a week; first semester.*
Assistant Professor ————

88. Ecology.—Plant Communities; the structure and development of the local plant associations. *Once or twice a week; second semester.*
Assistant Professor ————

BUSINESS LAW

Courses for Graduates and Advanced Undergraduates

10. Law of Security Relations and Banking.—*Three times a week; either semester.* Assistant Professor DILLAVOU

BUSINESS ORGANIZATION AND OPERATION

Work may be done in the field of business organization and operation for a major or a minor for the M.S. degree, and for a minor for the doctorate. To do major work in this field, the student must have completed an undergraduate curriculum equivalent to that of the college of commerce and business administration. To do minor work, he must have had at least five semester hours' credit in the principles of economics, also Business Organization and Operation 1 and 2 or the equivalent; Business Organization and Operation 1 is a prerequisite for 104.

Courses for Graduates

102. Marketing Policies and Problems.—*Twice a week; both semesters. One unit.* Associate Professor CONVERSE

104. Scientific Management.—The history of the scientific management movement; critical study of the proposed systems. *Twice a week; both semesters. One unit.* Associate Professor ANDERSON

107. Sales Campaigns.—*Twice a week; both semesters. One unit.*
Professor RUSSELL

129. Thesis.—*Time to be arranged; both semesters. One unit.*
Professor RUSSELL and others

Courses for Graduates and Advanced Undergraduates

3. Retail and Wholesale Store Organization and Operation.—*Three times a week; first semester.* Mr. BEHRENS

4. Management in Manufacturing.—*Three times a week; either semester.*
Associate Professor ANDERSON

7. Salesmanship.—*Twice a week; either semester.* Mr. CAGANN

8. Advertising.—*Three times a week; either semester.* Professor RUSSELL

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9. Trade and Civic Organizations.—*Twice a week; second semester.*
Dean THOMPSON, Mr. KLINE

14. Problems in Industrial Management.—*Three times a week; either semester.* Associate Professor ANDERSON

17. Sales Management.—*Twice a week; second semester.*
Professor RUSSELL

18. Advertising Campaigns.—*Three times a week; second semester.*
Professor RUSSELL

20. Credits and Collections.—*Twice a week; second semester.*
Associate Professor CONVERSE

70. Operation of Public Utilities.—*Three times a week; second semester.*
Mr. ORLAND

75. Management of Public Utilities.—*Three times a week; first semester.*
Assistant Professor GRAY

CERAMIC ENGINEERING

Graduate work leading to the degrees of Master of Science and Doctor of Philosophy in chemistry (ceramic chemistry), and Master of Science and Doctor of Philosophy in ceramic engineering, are offered by the department. Graduate students who wish to elect ceramic chemistry as their major field of study must have had the equivalent of twenty-five semester hours of chemistry and this must include satisfactory courses in general chemistry, qualitative and quantitative analysis, and either physical or organic chemistry. Such students must also have had at least one year of college physics and training in mathematics which includes calculus.

The prerequisites for graduate work in ceramics or ceramic engineering are the equivalents of the undergraduate courses required for the degrees of Bachelor of Science in ceramics or ceramic engineering according to the branch of the subject in which registration is desired.

Candidates for the degree of Doctor of Philosophy with their major field of study in ceramic chemistry must fulfill the same general requirements in chemistry as candidates in other branches of chemistry. Before receiving the degree of Doctor of Philosophy in ceramic chemistry and in engineering, all candidates must demonstrate their ability to read French and German literature in their major subject.

Courses for Graduates

101. The Chemistry of the Compounds of Silicon.—*Twice a week; both semesters. One unit.* Professor PARMELEE

102. General Technology of the Clay Industries.—*Both semesters. One to two units.* Professor PARMELEE

103. Silicon Chemistry.—Laboratory to supplement Ceramic Engineering 101, which must precede or accompany it. *Second semester. One to two units.* Professor PARMELEE

104. Technology of Glass.—*Second semester. One to two units.* Professor PARMELEE

105. Methods of Ceramic Research.—*Once a week; second semester. One unit.* Professor PARMELEE

Courses for Graduates and Advanced Undergraduates

5. Ceramic Bodies.—*Five times a week; first semester.* Professor PARMELEE

7. Heavy Clay Products.—*Three times a week; first semester.* Associate Professor ANDREWS

8. Glass Technology.—*Twice a week; second semester.* Professor PARMELEE

10. Cements.—*Three times a week; second semester.* Associate Professor ANDREWS

11. Drying Clay Products.—*Three times a week; second semester.* Associate Professor HURSH

14. Glasses and Glazes.—*Three times a week; second semester.* Professor PARMELEE

16. Enamels.—*Three times a week; first semester.* Professor PARMELEE

18. Ceramic Microscopy.—*Three times a week; first semester.* Mr. THOMPSON

20. Refractory Materials.—*Twice a week; second semester.* Associate Professor HURSH

22. Kilns and the Burning of Clay Products.—*Three times a week; first semester.* Associate Professor HURSH

23. Dryer and Kiln Design.—*Twice a week; first semester.* Associate Professor HURSH

24. Ceramic Engineering Design.—*Three times a week; second semester.* Associate Professor HURSH

28. Pyrochemical Problems.—*Twice a week; second semester.* Associate Professor ANDREWS

CHEMISTRY

Graduate students whose major subject is in some department other than chemistry, before taking graduate work for credit in this department, must have had the equivalent of 15 university credits in chemistry, and the ground covered should include satisfactory work in general chemistry and in qualitative and quantitative analysis and elementary organic chemistry. Such students are advised to make selections from the following courses: Chemistry 40, 41, 42b, 43b, 27, 28b, 18b, 36b and 37b, 50a, 15a, 16a and 97a. Courses of a more special nature will not as a rule be accepted for graduate work unless preceded by one of the courses above. Graduate students who are candidates for an advanced degree in chemistry must have had the equivalent of 25 university credits in chemistry properly distributed.

Graduate students whose major subject is in some department other than chemistry and who intend to take a first minor in chemistry or any branch of chemistry toward the Ph.D. degree must include among the courses taken, Chemistry 40 and 41, or must have had the equivalent.

Graduate students who are candidates for the M.A. or M.S. degree in chemistry must include in the courses taken, Chemistry 40 and 41 or must have had the equivalent. Graduate students who are candidates for the Ph.D. degree in any branch of chemistry must include among their courses, Chemistry 40, 41, 42b and 43b or must have had the equivalent.

Courses for Graduates

INORGANIC CHEMISTRY AND QUALITATIVE ANALYSIS

101a-101b. Inorganic Chemistry.—The less familiar elements and their relationship in the periodic system. Lectures; recitations. *Twice a week; both semesters. One-half unit.*
Assistant Professor KREMERS

102a-102b. Inorganic Chemistry.—(Laboratory). Inorganic preparations and qualitative analysis of the less familiar elements. To accompany or follow Chemistry 101a-101b. *One to three times a week; both semesters. One-fourth to three-fourths unit.*
Assistant Professor YNTEMA

N105a-N105b. Inorganic Chemistry.—(Seminary and Special Topics.) Current literature; special topics for 1929-30. First semester: Reactions in Liquid Ammonia and the Chemistry of the Hydronitrogens (Dr. Audrieth); second semester General Reactions of Inorganic Chemistry (Dr. Yntema). *One, two or three times a week; both semesters. One-fourth to one unit.*
Assistant Professor REEDY

QUANTITATIVE CHEMISTRY

124a. Quantitative Analysis.—A modern survey of advanced principles, calculations, experimental methods and applications. Lectures, with or without

laboratory. *Twice a week; first semester. One-half to one and one-fourth units.*
Professor CLARK, Assistant Professor SMITH

125a-125b. Quantitative Analysis.—(Seminar). Special topics in analytical chemistry. (Required of all students taking a major or minor in analytical chemistry). *One to three times a week; both semesters. One-fourth to one unit.*
Professor CLARK

126b. Quantitative Analysis.—(Selected topics in quantitative organic chemistry). Critical survey of methods of analysis for elementary constituents, application of polarimetry, refractometry, microscopy and other instrumental methods. Lectures, laboratory work. *Two to five times a week; second semester. One-half to one and one-fourth units with laboratory.*
Assistant Professor ENGLIS

127a-127b. Modern Applications of Radiation and Other Physical Methods in Chemical and Industrial Problems.—(X-rays, radioactivity, optical spectroscopy, spectrophotometry). *Twice a week; both semesters. One-half to one unit.*
Professor CLARK

ORGANIC CHEMISTRY

132a. Organic Chemistry.—(First course). Review of the general reactions in organic chemistry: Problems. *Twice a week; first semester. Three-fourths unit.*
Professor ADAMS

133b. Organic Chemistry.—Geometric isomerism; tautomerism; mechanisms of important reactions; etc. *Twice a week; second semester. Three-fourths unit.*
Professor ADAMS

134. Organic Chemistry.—(Laboratory). Advanced preparations are selected to meet the needs of each individual in the course. Microcombustions. *Two to four times a week; both semesters. One-half to one unit.*
Assistant Professor FUSON

135a-135b. Organic Chemistry.—(Seminar). Current literature. (Required of all students majoring in organic chemistry). *Once a week; both semesters. One-fourth unit.*
Professor ADAMS

136a. Organic Chemistry.—Special topics. *Twice a week; first semester. Three-fourths unit.*
Associate Professor MARVEL

PHYSICAL CHEMISTRY

145a-145b. Physical Chemistry.—(Seminar). Recent development in physical chemistry. *Twice a week; both semesters. Three-fourths unit.*
Professor RODEBUSH and staff

PHYSIOLOGICAL CHEMISTRY

150b. Physiological Chemistry.—Chemistry of intermediary metabolism. Lectures; discussions; readings. *Twice a week; second semester. Three-fourths unit.*
Professor ROSE

152a-152b. Physiological Chemistry.—Difficult biochemical preparations; analytical methods; chiefly laboratory. *One to five times a week; both semesters. One-half to one unit.* Professor Rose

155a-155b. Physiological Chemistry.—(Seminar). Current literature. (Required of all students majoring in physiological chemistry). *Twice a week; both semesters. Three-fourths unit.* Professor Rose

INDUSTRIAL CHEMISTRY

160a-160b. Advanced Chemical Technology, and Chemical Engineering.—Recent developments in the chemical industry. Lectures. *Twice a week; both semesters. Three-fourths unit.* Professor Keyes

161a-161b. Chemical Plant Design.—Calculations and layout of equipment for recently developed processes. *Twice a week; both semesters. Three-fourths unit.* Associate Professor Krase

163a-163b. Fuels and Their Combustion.—Special studies of the origin, composition, carbonization, and gasification of coal; carbonization equipment; application and design of combustion equipment. *Twice a week; both semesters. One-half unit.* Assistant Professor Layng

SANITARY CHEMISTRY

186a-186b. Sanitary Chemistry.—Special problems and new developments in sanitary chemistry. *Twice a week; both semesters. One-half to one and one-fourth units.* Professor Buswell

MISCELLANEOUS

190a-190b. Research.—A thesis is usually required of students taking the Master's degree and is always required of students taking the degree of Doctor of Philosophy. *Both semesters.* Work may be taken in the following subjects:

Physical and Electrochemistry—Professor Rodebush, Assistant Professor Phipps, Professor Clark, Assistant Professor Reedy

Inorganic Chemistry—Assistant Professors Reedy, Kremers, Yntema

Analytical Chemistry—Professor Clark, Assistant Professors Smith and Englis

X-ray Chemistry—Professor Clark

Food Chemistry—Assistant Professor Englis

Organic Chemistry—Professor Adams, Associate Professor Marvel, Assistant Professors Shriner, Fuson

Sanitary Chemistry—Professor Buswell

Physiological Chemistry—Professor Rose, Dr. Cox

Industrial Chemistry—Professor Keyes, Assistant Professors Layng, Krase

Ceramic Chemistry—Professor Parmelee

Phyto-Chemistry—Assistant Professor Englis

Photo-Chemistry—Dr. Villars

Courses for Advanced Undergraduates and Graduates

INORGANIC CHEMISTRY AND QUALITATIVE ANALYSIS

15a. Inorganic Chemistry.—The common elements; periodic relationship; preparation and application of the common elements and compounds. Lectures; recitations. *Twice a week; first semester.* Assistant Professor KREMERS

16a. Inorganic Chemistry.—(Laboratory). Preparation of the less easily produced inorganic compounds. *Twice a week; first semester.*
Assistant Professor KREMERS and assistants

18b. Qualitative Analysis.—(Second course). Methods of separation; qualitative reagents; theory of reactions. Lectures; seminar. *Twice a week; second semester.* Assistant Professor REEDY

QUANTITATIVE CHEMISTRY

27. Quantitative Analysis.—Special methods and instruments; gas analysis, electrometric titration, colorimetry, and other advanced analyses. *Four times a week; both semesters.* Assistant Professor SMITH, Dr. ELDER

28b. Analytical Chemistry.—(Second course). Quantitative methods of analytical chemistry. Analysis of ores and alloys. Stoichiometry. *Six times a week; second semester.* Assistant Professor SMITH

ORGANIC CHEMISTRY

36b. Organic Chemistry.—(Second course). *Three times a week; second semester.* Associate Professor MARVEL

37b. Organic Chemistry.—(Laboratory). (Second course). Organic synthesis. To accompany 36b. *Twice a week; second semester.*
Assistant Professor FUSON

38a. Qualitative Organic Analysis.—Identification of pure organic compounds and mixtures. *Twice a week; first semester.*
Assistant Professor SHRINER

PHYSICAL CHEMISTRY

40. Elementary Physical Chemistry.—*Three times a week; both semesters.*
Professor RODEBUSH, Assistant Professor PHIPPS

41. Elementary Physical Chemistry.—(Laboratory). To accompany Chemistry 40. *Once a week; both semesters.*
Professor RODEBUSH, Assistant Professor PHIPPS and assistants

42b. Elementary Physical Chemistry.—*Three times a week; second semester.*
Professor RODEBUSH, Assistant Professor PHIPPS

43b. Elementary Physical Chemistry.—(Laboratory). *Once a week; second semester.* Professor RODEBUSH, Assistant Professor PHIPPS and assistants

44a-44b. Physical Chemistry.—Thermodynamics and free energy calculations. Atomic structure. *Twice a week; both semesters.*
Professor RODEBUSH, Assistant Professor PHIPPS

49a. Chemistry of Colloids.—(Sanitary Division). Preparation and properties of colloids. Special apparatus and technique employed in colloid chemistry. *Twice a week; first semester.* Professor BUSWELL

PHYSIOLOGICAL CHEMISTRY

50a. Physiological Chemistry.—Proteins, fats, and carbohydrates; tissues, digestion, intestinal putrefaction, and feces; quantitative analysis of gastric contents, blood, milk, and urine. Lectures; laboratory. *Five times a week; first semester.* Professor ROSE, Dr. COX, and assistants

51b. Problems of Metabolism.—Micro-methods of blood and urine analysis, and their application. Lectures; laboratory. *Three times a week; second semester.* Dr. COX, and assistants

INDUSTRIAL CHEMISTRY

60a-60b. Chemical Technology.—The survey of important processes and recent developments in the chemical industry; inspection trip. (Estimated cost of this trip is $30-35 per student). Laboratory. *Four times a week; both semesters.* Assistant Professor LAYNG and Mr. HOWARD

61a-61b. Principles of Chemical Engineering.—The application of scientific principles to the unit operations of chemical engineering. Lectures; laboratory. *Four times a week; both semesters.* Professor KEYES, Assistant Professor KRASE

62a. Principles of Research and Development.—The fundamental methods used in the research and development departments in chemical industry. *Twice a week; first semester.* Professor KEYES

63. Fuels and Their Combustion.—Composition of fuels; principles of combustion; combustion equipment. Lectures; laboratory. *Three times a week; first or second semesters.* Assistant Professor LAYNG

64b. The Flow of Heat.—The mechanism of heat transmission by conduction, convection and radiation; practical problems. *Twice a week; second semester.* (Not given 1929-30). Assistant Professor LAYNG

65b. Industrial Stoichiometry.—Graphical representation; problems in chemical engineering; data. *Twice a week; second semester.* Assistant Professor LAYNG

67a-67b. Evaporation.—The theory, design and control of commercial evaporative equipment. *Twice a week; both semesters.* Assistant Professor KRASE

68a. Mechanical Separation.—Equipment for the mechanical separation of solids, liquids and gases. Theory and calculations. *Twice a week; first semester.* (Not given 1929-30). Assistant Professor KRASE

69b. Flow of Gases and Liquids.—Fundamental theory and application. The design of measuring devices and other equipment. *Twice a week; second semester.* (Not given 1929-30). Assistant Professor KRASE

70b. Humidification and Drying.—Calculations and mathematical studies of humidifiers and driers. *Twice a week; second semester.* (Not given 1929-30). Mr. HOWARD

71a. Sampling, Grinding, and Mixing.—Fundamental principles involved and mathematical calculations. *Once a week; first semester..* Mr. HOWARD

72b. Distillation.—Calculations in the operation and design of distillation equipment. *Twice a week; second semester.* Mr. HOWARD

73a. Metallurgy.—Manufacture of iron and steel. *Three times a week; first semester.* Mr. HOWARD

74b. Metallurgy and Metallography.—General metallurgy of iron and steel; physical characteristics and microstructure of metals and alloys. Lectures; laboratory. *Three times a week; second semester.* Mr. HOWARD

SANITARY CHEMISTRY

86b. Chemistry of Sanitation.—Lectures, demonstrations, and field trips covering the field of water purification, sewage treatment, and general sanitation. *Three times a week; second semester.* Professor BUSWELL, Mr. NEAVE

49a. Chemistry of Colloids.—(See physical division).

MISCELLANEOUS COURSES

92a. Chemical Literature and Reference Work.—*Once a week; first semester.*

95a. History of Chemistry.—Lectures; reading. *Twice a week; first semester.* Professor RODEBUSH

97a. Food Analysis.—Quantitative organic analysis of food products; alcohols, carbohydrates, fats and oils, cereals, nitrogenous bodies, preservatives, and colors. *Six times a week; first semester.*
Assistant Professor ENGLIS and assistant

CIVIL ENGINEERING

The prerequisite for graduate work in civil engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in civil engineering in the branches of the subject in which registration is desired.[1]

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[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other fields.

Courses for Graduates

101. Water Supply Engineering.—*Twice a week; first semester. One unit.* (Not given 1929-30).

102. Sewerage.—*Twice a week; second semester. One unit.* (Not given 1929-30).

103. Highway Construction.—*Twice a week; first semester. One unit.* Professor CRANDELL

104. Municipal Engineering.—*Twice a week; second semester. One unit.* Professor CRANDELL

105. Advanced Reinforced Concrete Theory.—*Twice a week; first semester. One unit.* Professor CROSS

106. Reinforced Concrete Structures.—*Twice a week; first semester. One to three units.* Professor CROSS

107. Statically Indeterminate Structures and Secondary Stresses.—*Twice a week; first semester. One unit.* Professor WILSON

108. Advanced Bridge Design.—*Twice a week; second semester. One or two units.* Professor CROSS

109. Water Purification and General Sanitation.—*Twice a week; first semester. One unit.* (Not given 1929-30).

110. Sewage Disposal, Wastes Disposal and General Sanitation.—*Twice a week; second semester. One unit.* (Not given 1929-30).

112. Masonry Construction and Foundations.—*Twice a week; second semester. One unit.* Professor HUNTINGTON

113. Appraisals and Rate Making.—*Twice a week; second semester. One unit.* Professor ————

124. Steel Building Construction.—*Twice a week; first semester. One or two units.* Professor HUNTINGTON

125. Advanced Design of Industrial Structures.—*Twice a week; second semester. One unit.* Dean KETCHUM

130. Advanced Hydrology.—*Twice a week; first or second semester. One unit.* Associate Professor PICKELS

Courses for Advanced Undergraduates and Graduates[1]

63. Statically Indeterminate Structures.—The elastic theory and its applications in statically indeterminate structures. *Three times a week; first semester.* Professor CROSS

[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other fields.

64. Statically Indeterminate Structures.—A continuation of course 63. *Three times a week; second semester.* Professor Cross

See also Mechanics, Theoretical and Applied, and Railway Engineering.

THE CLASSICS

The Degree of Master of Arts in the Classics.—The major may be either Latin or Greek.

The Degree of Doctor of Philosophy in the Classics.—The degree is given in classical philology. Major work may be taken in either Latin or Greek, but whichever language is taken as a major, the other must be taken as a first minor.

GREEK

Preparation for first-year graduate work in Greek must include at least two years of preparatory Greek, two years of college Greek, and two years of college Latin. A reading knowledge of French and German is important for candidates in this subject. The study of history and philosophy is especially recommended.

Courses for Graduates

105. Plato and Aristotle.—*Twice a week; first semester. One unit.*
Professor Oldfather

106. The Drama.—*Twice a week; second semester. One unit.*
Associate Professor Perry

110. Bibliography and Criticism.—(Thesis course; the same as Latin 110). *Once a week; both semesters. One unit.*
Professors Oldfather, Canter and others

120. Theocritus.—*Twice a week; first semester. One unit.*
Associate Professor Perry

Courses for Graduates and Advanced Undergraduates

5. Herodotus and Lyric Poets.—Lectures and assignments on the Greek language. *Three times a week; first semester.* Dr. Couch

7. Greek Drama: Tragedy and Comedy.—Lectures and assignments on the Greek language. *Three times a week; second semester.* Dr. Couch

LATIN

Preparation for first-year graduate work in Latin must include at least two years of preparatory Latin and four years of college Latin, or three years of preparatory Latin and three years of college Latin. A reading knowledge of French and German is important. Some acquaintance with Greek is highly desirable, and the study of history and philosophy is especially recommended.

Courses for Graduates

102. Roman Oratory.—*Twice a week; second semester. One unit*
Professor Canter

104. Latin Palaeography.—*Twice a week; second semester. One unit.*
Professor OLDFATHER

109. Vergil.—*Twice a week; first semester. One unit.* Professor CANTER

110. Bibliography and Criticism.—(Thesis course; the same as Greek 110). *Once a week; both semesters. One unit.*
Professors OLDFATHER, CANTER and others

117. Lucretius.—*Twice a week; second semester. One unit.*
Associate Professor PERRY

118. The Latin Romance.—*Twice a week; first semester. One unit.*
Associate Professor PERRY

Courses for Graduates and Advanced Undergraduates

23. Livy (selections); Tibullus and Propertius.—*Three times a week; first semester.* Professor CANTER

24. Ovid (selections); Seneca (Epist. and Trag.).—*Three times a week; second semester.* Professor CANTER

DAIRY HUSBANDRY

Candidates for advanced degrees in dairy husbandry must have had adequate training in collegiate courses dealing with the principles of the subject which the candidate elects as his major.

Candidates registering in dairy husbandry as a major subject must register for one minor in a subject closely related to the major, and this may under certain conditions and with proper approval be a division of the major field of study. However, in such cases, this will constitute a second minor.

It is recommended that at least one minor be selected in a field outside the College of Agriculture.

Students desiring to specialize in plant breeding (or animal breeding) are referred to the Zoology Department for the fundamental courses in Genetics.

Courses for Graduates

101. Economic Milk Production.—*Twice a week; both semesters. One-half to two units.* Professor FRASER

104. Dairy Bacteriology.—Fermentation in dairy products. *Both semesters. One-half to one unit.* Professor PRUCHA

105. Dairy Manufactures.—*Both semesters. One-half to two units.*
Professor RUEHE

106. Dairy Bacteriology.—Research on assigned problems. *Both semesters. One-half to two units.* Professor PRUCHA

107. Dairy Chemistry.—Assigned problems. *Both semesters. One-half to two units.* Assistant Professor OVERMAN

108. Physiology of Lactation.—*Once a week; both semesters. One-half to two units.* Professor GAINES

112. Research.—*Both semesters, one to four units.* Special problems along the following lines:

(a) **Dairy Bacteriology.** Professor PRUCHA

(b) **Dairy Chemistry.** Assistant Professor OVERMAN

(c) **Dairy Cattle Breeding.** Associate Professor YAPP

(d) **Dairy Cattle Feeding.** Assistant Professor NEVENS

(e) **Milk Production.** Professor GAINES

(f) **Dairy Manufactures.** Professor RUEHE

NOTE: Graduate students writing a thesis should so indicate in registering in Dairy Husbandry 112.

Courses for Graduates and Advanced Undergraduates

4. Ice Cream Making.—*Four times a week; first semester.* Assistant Professor TRACY

5. Composition of Dairy Products.—*Three times a week; second semester.* Assistant Professor OVERMAN

7. Creamery Buttermaking and Factory Management.—*Five times a week; second semester.* Professor RUEHE

10. Dairy Bacteriology.—*Three times a week; first semester.* Professor PRUCHA, Assistant Professor BRANNON

14. Milk Condensing.—*Three times a week; second semester.* Assistant Professor TRACY

17. Advanced Study of Dairy Breeds.—*Three times a week; first semester.* Associate Professor YAPP

20. Economic Problems in Dairy Farming.—*Three times a week; first semester.* Professor FRASER

21. Economic Milk Production.—*Three times a week; second semester.* Professor FRASER

25. Advanced Dairy Cattle Feeding.—*Twice a week; first semester.* (Not given 1929-30.) Assistant Professor NEVENS

ECONOMICS

Every student entering on major graduate work in economics must have had a course in the principles of the science and also in some special part of the field such as public finance or money and banking. The work must represent at least eight semester hours. He must have had at least one semester's work in English, American, or general European history; and at least three hours in political science.

Those who take the subject as a minor must have had a course of at least five semester hours in the principles.

Graduate students who are making economics their major are required during their first year to acquaint themselves with the works of the masters in the science, by taking either course 101 or 103. In the same or subsequent year they are expected to elect the fundamental courses in some other divisions of the field of economics, as indicated by the divisions listed in the Economic Seminar, course 118. One of the minors for the doctor's degree may be taken in a separate division of economics; the other must be taken out of the department, and preferably outside of the College of Commerce.

The following courses may be taken by students in general economics for major or minor credit; all numbered above 100; 4, 10, 11, 13, 14, 15, 17, 24, 25, 29, 30, 41, 42, 43, 44, 51, 52, 54, 55, 61, 71, 72, 81. The following may be taken for minor credit only: 8, 9, 31, 36, 56, 82.

Two units will be accepted for a first minor for the master's degree; and four two or three-hour graduate courses, or their equivalent in advanced undergraduate courses, for a first minor for the doctor's degree.

Courses in transportation may be included in their programs by students of Economics as part of their major; courses in transportation, accountancy, and business organization and operation may be used to satisfy the requirements for the minor. See Business Organization and Operation, and Transportation.

Courses for Graduates

101. Economic Theory.—*Three times a week; both semesters. One unit.*
Professor WESTON

102. Theory of Money, Credit, and Prices.—*Twice a week; both semesters. One unit.* Professor WESTON

103. The Distribution of Wealth.—*Twice a week; both semesters. One unit.* (Not given in 1929-30). Professor WESTON

104a. Theories and Policies of International Trade.—*Twice a week; first semester. One unit.* Professor LITMAN

104b. Organization of International Trade.—*Twice a week; second semester. One unit.* Professor LITMAN

105. Public Finance.—*Twice a week; both semesters. One unit.*
Associate Professor HUNTER

106. International Exchange and the Money Markets.—*Twice a week; second semester. One unit.* Associate Professor WRIGHT

107. The Corporation in Economic Evolution.—*Twice a week; both semesters. One unit.* Professor ROBINSON

109. The Theory and Practice of Central and Reserve Banking.—*A comparative study. Twice a week; first semester. One unit.*
Associate Professor WRIGHT

110a. Finance and Investments: Fundamental Principles Applied to Business Interests of a Simple Character.—*Twice a week; both semesters. One unit.*
Professor ROBINSON

110b. Finance and Investments: Complex Business Units.—*Twice a week; both semesters. One unit.* (Not given in 1929-30). Professor ROBINSON

112. Labor Problems.—*Twice a week; both semesters. One unit.*
Assistant Professor BERMAN

Arranged in a two-year cycle:

1929-30: *first semester,* Socialism and Economic Reform; *second semester,* Labor and the Law.

1930-31: *first semester,* Social aspects of Labor; *second semester,* Trade Unionism.

118. Seminar.—Thesis Course. (All graduate students majoring in Economics must register in Economics 118, but only those students who are writing theses will be given credit.)

(a) Third Year: Seminar. Professor WESTON

(b) First Year: General Economics. Assistant Professor BROWN

(c) First Year: Agricultural Economics. Associate Professor STEWART

(d) First Year: Public Utilities. Assistant Professor GRAY

120. History of Economic Thought.—*Twice a week; both semesters. One unit.* Professor WESTON

122. Economic History of the United States.—*Twice a week; both semesters. One unit.* (Not given in 1929-30). Professor BOGART

124. International Finance.—*Twice a week; both semesters. One unit.*
Professor BOGART

130. Theory of Agricultural Economics.—*Twice a week; both semesters. One unit.* Associate Professor STEWART

131. Agricultural Resources and Prices.—*Twice a week; both semesters. One unit.* Assistant Professor NORTON

132. Agricultural Economics Research.—Only those who write acceptable theses will receive credit. *Once a week; both semesters. One to two units.*
Associate Professor STEWART

143. The Administration of Industrial Relations.—*Twice a week; both semesters. One unit.* (Not given in 1929-30).

Theory of Statistics.—See Mathematics 129.

144. Statistical Theory and Analysis.—*Twice a week; both semesters. One unit.* Associate Professor ————

180. Management of Public Utilities.—*Twice a week; both semesters. One unit.* Assistant Professor GRAY

Courses for Graduates and Advanced Undergraduates

4. History of Money and Banking Institutions.—*Three times a week; first semester.* (Not given in 1929-30). Associate Professor WRIGHT

8. Domestic and Foreign Exchange and the Money Markets.—*Three times a week; second semester.* Associate Professor WRIGHT

9. Advanced Theory and Practice of Banking.—*Three times a week; first semester.* Associate Professor WRIGHT

10. Corporation Finance and Management.—*Three times a week; second semester.* Professor ROBINSON

11. Industrial Consolidation.—Development; plans for controlling trusts. *Three times a week; first semester.* Professor ROBINSON

13. Marketing and Prices of Agricultural Products.—*Three times a week; first semester.* Associate Professor STEWART

14. Cooperation in Agriculture.—*Twice a week; second semester.* Dr. BARTLETT

15. Financing Agriculture.—*Three times a week; second semester.* Assistant Professor NORTON

17. Economic History of Agriculture.—*Twice a week; first semester.* (Not given in 1929-30). Assistant Professor NORTON

18. Land Economics.—*Three times a week; second semester.* Associate Professor STEWART

24. Economic Development of Modern Europe.—*Three times a week; second semester.* Professor BOGART

25. Economic History of England.—*Three times a week; first semester.* Professor BOGART

29. Foreign Commerce and Commercial Policies.—*Three times a week; second semester.* Professor LITMAN

30. World Markets.—*Three times a week; second semester.* Professor LITMAN

31. Organization of Foreign Commerce.—*Three times a week; first semester.* Professor LITMAN

35. Corporation Finance.—*Three times a week; first semester.* Assistant Professor BROWN

36. Investments.—*Three times a week; second semester.* Professor ROBINSON

41. Introduction to Labor Problems.—*Three times a week; first semester.* Assistant Professor BERMAN

42. Labor Organizations and Employers' Associations.—*Twice a week; second semester.* Assistant Professor BERMAN

43. Personnel Administration.—*Three times a week; second semester.*
Dr. DICKINSON

44. Socialism and Economic Reform.—*Twice a week; first semester.*
Assistant Professor BERMAN

51. Public Finance.—*Three times a week; first semester.*
Associate Professor HUNTER

52. Taxation.—*Three times a week; second semester.*
Associate Professor HUNTER

54. The Fiscal System of Illinois.—*Twice a week; second semester.*
Associate Professor HUNTER

55. Economics of Insurance (Life).—*Three times a week; first semester.*

56. Economics of Insurance (Property).—*Three times a week; second semester.*
Dr. DICKINSON

58. Urban Land Economics.—*Three times a week; first semester.*
Dr. DICKINSON

61. Economic Theory.—*Twice a week; both semesters.*
Associate Professor HUNTER; Assistant Professor BROWN

71. Economic Statistics.—*Three times a week; first semester.*

72. Economic Statistics. (Business Barometers).—*Three times a week; second semester.*
Assistant Professor NORTON

81 Principles of Public Utilities.—*Three times a week; first semester.*
Assistant Professor GRAY

82. Regulation of Public Utilities.—*Twice a week; both semesters.*
Assistant Professor DILLAVOU

83. Public Utility Rates.—*Three times a week; second semester.*
Assistant Professor GRAY

EDUCATION

Students who elect education as a major subject must have completed at least a three-hour course in the principles of education, a course of at least the same length in the history of education, and a minimum of three hours each in psychology and philosophy. For graduate students who have had experience in teaching these requirements may be modified.

Courses for Graduates

101. Educational Theory.—*Twice a week; one hour; second semester. One unit.*
Professor CAMERON

102. Research in History of American Education.—*Once a week; two hours; both semesters. One unit.* Professor SEYBOLT

104. Educational Administration.—*Twice a week; one hour; both semesters. One unit.* Dean CHADSEY

106. High School Administration.—*Once a week; two hours; first semester. One unit.* Professor CLEMENT

110. Methods of Teaching.—*Once a week; two hours; first semester. One unit.* Professor MONROE

119. Curriculum Construction.—*Once a week; two hours; second semester. One unit.* Professor MONROE

120a. Supervision in Secondary Education.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

121. Educational Measurement.—*Once a week; two hours; second semester. One unit.* Assistant Professor ODELL

123. Educational Statistics.—*Once a week; two hours; first semester. One unit.* Assistant Professor ODELL

124. Theory of Educational Research.—*Once a week; two hours; first semester. One unit.* Professor MONROE

125a. Educational Psychology.—*Once a week; two hours; first semester. One unit.* Professor CAMERON

125b. Educational Psychology.—*Once a week; two hours; second semester. One unit.* Professor CAMERON

127. High School Curricula.—*Once a week; two hours; both semesters. One unit.* Professor CLEMENT

131. Analysis and Evaluation of High School Texts.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

133. Studies in Secondary Education.—*Once a week; two hours; first semester. One unit.* Professor CLEMENT

141. Problems in the Teaching of English in the Secondary School.—*Once a week; two hours; both semesters. One unit.* Professor PAUL

150. Thesis.—*Both semesters. One or two units.* Dean CHADSEY and others

170. Public School Business Administration.—*Once a week; two hours; second semester. One unit.* Dr. WEBER

Courses for Graduates and Advanced Undergraduates

4. Problems of Educational Administration.—Interpretation of present tendencies. *Three times a week; first semester.* Dr. WEBER

11. Ancient and Medieval Education.—*Twice a week; first semester.* Professor SEYBOLT

18. Educational Measurements.—*Three times a week; both semesters.*
Assistant Professor ODELL

20a. Supervision of Secondary Education.—*Twice a week; first semester.*
Professor CLEMENT

26. The Junior High School.—*Twice a week; second semester.*
Professor CLEMENT

27. High School Curricula.—*Twice a week; second semester.*
Professor CLEMENT

30. History of American Education.—*Twice a week; second semester.*
Professor SEYBOLT

41. Vocational Education.—*Three times a week; first semester.*
Professor MAYS

42. Special Education.—*Twice a week; first semester.* Dr. DOLCH

43. Mental Tests.—*Three times a week; second semester.*
Professor CAMERON

44. Educational Psychology.—(Laboratory Course.) *Three times a week; first semester.* Professor CAMERON

49. Principles of Intellectual Development.—*Three times a week; second semester.* Associate Professor GRIFFITH

53. Problems of Industrial Education.—*Three times a week; both semesters.*
Professor MAYS

54. Function and Methods of Part-time Teaching.—*Twice a week; first semester.* Professor MAYS

54a. Curriculum Construction in the Part-time Schools.—*Twice a week; second semester.* Professor MAYS

55. Problems of Vocational Guidance.—*Three times a week; second semester.* Professor MAYS

ELECTRICAL ENGINEERING

The prerequisite for graduate work in electrical engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in electrical engineering in the branches of the subject in which registration is desired.

Graduate students who wish to take a minor in electrical engineering must have had differential and integral calculus, and one year's work in college physics.

Courses for Graduates[1]

101. Advanced Course in Alternating Currents.—The theory of transient phenomena; polyphase circuits; measuring apparatus. *Twice a week; both semesters. One and one-half units.* Professor PAINE

[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other departments.

103. Electrical Designs.—*Twice a week; second semester. One unit.*
Assistant Professor WALDO

105. Electrical Engineering Research.—*Twice a week; both semesters. One to three units.* Professors PAINE, BROOKS

ENGLISH LANGUAGE AND LITERATURE

Students who enter on graduate work with English as their major subject are required to give evidence of their ability to write good English. They must present the equivalent of fourteen hours of undergraduate work in English literature, the required college work in rhetoric, and the equivalent of four semesters of college work in Latin, or in Greek, or in French, or in German. After the first year of graduate work a knowledge of French and German is indispensable.

Students making English their minor may be admitted to such courses as in the judgment of the instructor in charge they are qualified to pursue.

The Degree of Master of Arts in English.—In addition to complying with the general rules of the Graduate School, candidates for the degree of Master of Arts in English must comply with the following rules of the Department of English: (1) they must choose a portion of their work from the group of courses described as "for graduates;" (2) must offer an elementary course in Anglo-Saxon; and (3) must take besides the regular semester examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The degree of Master of Arts in Public Speaking. Candidates for the degree of Master of Arts in Public Speaking must comply with the following regulations: (1) They must satisfy the general requirements of the Department of English for admission to graduate work; (2) must offer a minor in English of not less than two units selected from 100 courses in English literature; (3) must take, besides the regular examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Doctor of Philosophy in English.—Candidates for the degree of Doctor of Philosophy in English may expect to be examined on the entire field of the English language and literature. They are urged, furthermore, to acquaint themselves as fully as possible with the history and philosophy of the period in which their main interest lies, and with the foreign languages and literatures most closely related to English in that period.

Courses for Graduates

101. Research in Special Topics.—*One or two units.*
Professors GRAHAM, BERNBAUM, FLOM, PAUL, ZEITLIN, E. C. BALDWIN, T. W. BALDWIN; Associate Professors H. S. V. JONES, HILLEBRAND, JEFFERSON; Assistant Professors RINAKER, PARRY, SECORD, FLETCHER, SANDFORD

110. Old English (Anglo-Saxon) Poetry.—*Twice a week; first semester.*
Professor FLOM

120. The History and Principles of Literary Criticism.—*Twice a week, second semester. One unit.* Assistant Professor FINNEY

121. History of Rhetorical Theory.—*Twice a week; both semesters. One unit.* (Not given 1929-30).

128. Literature of the Sixteenth Century.—*Twice a week; both semesters. One unit.* Associate Professor JONES

130. Tragedy.—*Twice a week; both semesters. One unit.*
Associate Professor HILLEBRAND

135. Problems in American Literature.—*Twice a week; first semester. One unit.* Professor PAUL

137. Prose Writers of the Nineteenth Century.—*Twice a week; both semesters. One unit.* Professor ZEITLIN

138. The Romantic Movement.—*Twice a week; both semesters. One unit.*
Professor BERNBAUM

140. Investigations in Modern English Literature.—(For second-year and third-year graduate students who are preparing theses for the Doctor's Degree.) *Three hours, once a week; both semesters. One to three units.* (May be taken in successive years.) Professor BERNBAUM

141. Literature of the Seventeenth Century.—*Twice a week; both semesters. One unit.* Professor E. C. BALDWIN

143. The History and Theory of Prose Fiction.—*Two hours, once a week; both semesters. One unit.* (May be taken in successive years.)
Professor BERNBAUM

145. Studies in Eighteenth Century Literature.—*Twice a week; both semesters. One unit.* Professor GRAHAM

146. The Text of Milton.—*Twice a week; second semester. One unit.*
Assistant Professor FLETCHER

147. Shakspeare and Elizabethan Drama.—Critical Study of the Chief Plays. *Twice a week; both semesters. One unit.* Professor T. W. BALDWIN

148. Seminar in Elizabethan Drama.—*Twice a week; second semester. One unit.* Professor T. W. BALDWIN

157. Spenser Seminar.—*Twice a week; first semester. One unit.*
Associate Professor JONES

Courses for Graduates and Advanced Undergraduates

A. ENGLISH LANGUAGE AND LITERATURE

3. The Poetry of Milton.—*Three times a week; second semester.*
Professor E. C. BALDWIN

4. English Versification.—*Three times a week; first semester.*
Assistant Professor LANDIS

5. Shakspeare.—*Three times a week; each semester.*
Professor T. W. Baldwin

8. Old English (Anglo-Saxon).—*Three times a week; first semester.*
Professor Flom

9. Beowulf.—*Three times a week; second semester.*
Associate Professor Jones

17. History of the English Language.—*Three times a week; second semester.*
Professor Flom

25. Chaucer.—*Three times a week; first semester.*
Associate Professor Jones

26. Spenser.—*Three times a week; second semester.*
Associate Professor Jones

30. Some American Novelists Since 1870.—*Three times a week; second semester.*
Dr. Tupper

31. English Literature from 1688 to 1789.—*Three times a week; second semester.*
Professor Graham

35. The English Drama (Previous to Shakspeare).—*Three times a week; first semester.*
Professor T. W. Baldwin

36. The English Drama (exclusive of Shakspeare) from 1600 to 1700.—*Three times a week; second semester.*
Professor Hillebrand

38. The Arthurian Tradition.—*Three times a week; second semester.*
Assistant Professor Parry

39. Introduction to Medieval Literature.—*Three times a week; first semester.*
Assistant Professor Parry

43. Browning.—*Three times a week; first semester.*
Assistant Professor Kyle

45. The Development of the Modern Drama.—*Three times a week; first semester.*
Associate Professor Hillebrand

52. The Great Novelists of the Nineteenth Century.—(Scott, Jane Austen, Dickens, Thackeray, Hawthorne, Eliot, Meredith, Hardy, Stevenson).—*Three times a week; second semester.*
Professor Bernbaum

53. Modern American Criticism.—*Three times a week; second semester.*
Professor Zeitlin

54a-54b. Introduction to Comparative Literature.—*Three times a week; both semesters.*
Professors Bernbaum, Oldfather, Fitz-Gerald, Oliver, Aron; Assistant Professors Van Horne, Landis, Perry, Parry, Associate Palfrey

56. Tennyson.—*Three times a week; first semester.* Professor GRAHAM

57. Great Foreign Novelists in Relation to the English Novel.—(Goethe, Hugo, Manzoni, Balzac, Dumas, Flaubert, Zola, Turgenev, Dostoevski, Tolstoi). *Twice a week.* (Not given in 1929-30.) Professor BERNBAUM

B. RHETORIC

17. Advanced Composition.—*Three times a week; first semester.* Assistant Professor RINAKER

C. PUBLIC SPEAKING

6. Persuasion and the Forms of Public Address.—*Three times a week; first semester.* Mr. YEAGER

7. Masters of Public Address.—*Three times a week; second semester.* Mr. YEAGER

8. Dramatization.—*Three times a week; first semester.* Mr. SWANSON

D. SCANDINAVIAN LANGUAGES

Preparation for major graduate work in the Scandinavian languages or literature must include a good knowledge of one of the Scandinavian languages and systematic work in the undergraduate courses in Scandinavian. Any graduate student in language may, however, be admitted to the purely philological courses.

Courses for Graduates

101. Old Norse.—Introduction to the language; grammar; reading of the *Prose Edda* in part, and selections from the sagas. *Twice a week; both semesters. One unit.* Professor FLOM

110. Advanced Old Norse (Old Norse Poetry).—Critical study of the *Poetic Edda. Twice a week; both semesters. One unit.* (Not given 1929-30.) Professor FLOM

130. The Runic Inscriptions (Introduction to Primitive Germanic.)—*Twice a week; second semester. One unit.* (Not given in 1929-30). Professor FLOM

150. Research.—Special problems in Scandinavian philology or literature. *Once a week. One-half to one unit.* Professor FLOM

Courses for Graduates and Advanced Undergraduates

14. History of Old Norse Literature.—Lectures on the mythological and heroic poetry; court poetry; sagas and romances; learned writings. *Twice a week; second semester.* (Not given in 1929-30.) Professor ————

ENTOMOLOGY

The prerequisite for graduate work in entomology is two years of undergraduate biology, including zoology and entomology. Entrance on major work in

entomology requires at least six hours of entomology. A reading knowledge of French and German is desirable by the beginning of the second year.

Courses for Graduates

102. Research in the Morphology and Embryology of Insects.—*Once or twice a week; both semesters. One-half to two units.*

Associate Professor HAYES

107. Insect Anatomy.—Lectures and laboratory. *Three times a week; both semesters. One-half unit.* Associate Professor HAYES

108. Research in Economic Entomology.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

109. Research in Systematic Entomology.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

110. Research in the Biology and Ecology of Insects.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

Courses for Graduates and Advanced Undergraduates

6. Special Problems.—*Once or twice a week; both semesters.*

Various Instructors

10. Morphology and Taxonomy of Immature Insects.—*Three times a week; both semesters.* (Given in 1929-30 and in alternate years).

Associate Professor HAYES

20. Insect Control.—*Three times a week; first semester.*

Professor METCALF

21. Insect Bionomics.—*Three times a week; second semester.*

Professor METCALF

FARM ORGANIZATION AND MANAGEMENT

Graduate work in Farm Organization and Management leading to a degree of Master of Science is open to students who have had a thoro training in the fundamental principles of the subject, either in connection with, or in addition to a course of study in agriculture substantially equivalent to that offered in this University. Such students must have had at least 8 hours of Economics.

In order to qualify for a master's degree in Farm Organization and Management, a student must take at least 2 units of work in Economics courses, either as part of his major, or as his first minor. Also, the student must take not less than three units of work from 100 courses in Farm Organization and Management. For courses in other departments which count as a major in Farm Organization and Management see Animal Husbandry 29, Economics 13, 14, 18, 130, and 131.

Courses for Graduates

101. Farm Organization and Management.—A study of principles, including an historical study of the contributions to the farm management field. *Twice a week; both semesters. One unit.* Associate Professor CASE

110. Farm Organization and Management Research.—Only those who write acceptable theses will receive credit. *Once a week; both semesters. One to two units.* Associate Professor CASE

Courses for Graduates and Advanced Undergraduates

4. Farm Operation.—*Twice a week; first semester.* Mr. ROSS

5. Farm Organization.—*Three times a week; second semester.* Associate Professor CASE

6. Land Tenure.—*Twice a week; first semester.* Associate Professor CASE

GENETICS

(See Zoology)

GEOLOGY

For graduate work in geology the student must have had at least a major in geology and an acceptable field training. Other graduate students with adequate technical preparation may be admitted to certain graduate courses.

For graduate work in geography the student must have had at least the equivalent of a major in geography.

Courses for Graduates

101. Advanced Crystallography.—*Twice a week; both semesters. One unit.* Professor BAYLEY

102. Igneous Petrography.—Lectures; laboratory. *Twice a week; both semesters. One unit.* Professor BAYLEY

103. Metamorphic Petrography.—Lectures; laboratory. *Twice a week; first semester. One unit.* (Not given in 1929-30). Professor BAYLEY

104. Pre-Cambrian Stratigraphy.—*Twice a week; second semester. One unit.* (Not given in 1929-30). Professor QUIRKE

108. Ore Deposition.—Problems in the origin of ore deposits, as illustrated by selected mining districts. *Three times a week; both semesters. One unit.* Professor BAYLEY

125. Sedimentation.—The interpretation of sedimentary rocks in terms of their origin. *One unit.* (Not given in 1929-30). Assistant Professor BEVAN

135. Research.—*Once a week; both semesters. One-half to four units.* Professors BAYLEY, SAVAGE, and QUIRKE; Associate Professor BLANCHARD, and Assistant Professors BEVAN and HOWARD

142. Stratigraphic Paleontology.—The invertebrate index fossils of the successive geologic formations. *Twice a week; both semesters. One unit.*
Professor SAVAGE

151. Advanced Dynamic Geology.—A critical analysis of geologic processes and their results; the materials and structure of the earth; problems of geologic interpretations. *Three times a week; first semester. One unit.*
Professor QUIRKE

152. Advanced Historical Geology.—Cosmogeny; the record of diastrophism; the development of the continents and oceans; the relationship between oceanic fluctuations and organic differentiation and evolution; physiographic, climatic, and organic history. *Three times a week; second semester. One unit.*
Assistant Professor BEVAN

160. Petroleum Geology.—*Twice a week; both semesters. One unit.*
Assistant Professor HOWARD

Courses for Graduates and Advanced Undergraduates

A. GEOLOGY

9. Invertebrate Paleontology.—*Three times a week; first semester.*
Professor SAVAGE

15. Structural Geology.—Rock deformation and its results. *Three times a week; first semester.* Assistant Professor SHEPARD

16. Stratigraphy.—Fossil faunas, with special reference to Paleozoic invertebrates. *Three times a week; second semester.* Dr. SUTTON

22. Mountain and Continental Structures.—*Three times a week; second semester.* Assistant Professor SHEPARD

38. Regional Geology of the United States.—The characteristics of individual geologic provinces. Recitations. *Three times a week; second semester.*
Assistant Professor BEVAN

47. Systematic Mineralogy.—*Three times a week; first semester.*
Professor BAYLEY

48. Silicate Minerals and Rocks.—*Five times a week; second semester.*
Professor BAYLEY

49. Microscopic Mineralogy.—*Five times a week; second semester.*
Assistant Professor HOWARD

60a-60b. Introduction to Research.—*Two or four times a week; both semesters.* Members of the Department

95. Economic Geology.—The nature, occurrence, origin, and uses of coal, oil, building stones, and bedded deposits of economic importance. *Three times a week; first semester.* Assistant Professor HOWARD

96. Economic Geology.—The nature, occurrence, and origin of metaliferous deposits. Theories of ore deposition. *Three times a week; second semester.*
Professor ————

B. GEOGRAPHY

5. Geography of South America.—*Three times a week; first semester.*
Associate Professor BLANCHARD

8. Geography of Europe.—*Three times a week; second semester.*
Associate Professor BLANCHARD

10. Geography of Africa.—*Three times a week; first semester.*
Assistant Professor ————

11. Geography of Asia.—*Three times a week; second semester.*
Miss POGGI

12. Historical Geography of the United States.—*Three times a week; second semester.* Assistant Professor ————

53a-53b. Advanced Industrial and Commercial Geography.—*Three times a week; both semesters.* Associate Professor BLANCHARD

GERMAN

Germanic Languages and Literature

Students desiring to take German as a major are required to have finished successfully a four-year course of undergraduate work in German, or its equivalent. They are also required to be familiar with the principal works of the writers of the classical and modern periods of German literature, to show a general knowledge of the history of German literature, and to be able to follow lectures in the German language.

Of collateral subjects, a reading knowledge of French is important and is required for advanced graduate work. Some acquaintance with Latin and with German history is highly desirable.

Courses for Graduates

101. Seminar.—*Twice a week; both semesters. One unit.* Professor ARON

103. Introduction to the Historical Study of the Germanic Languages.—History of German philology; comparative grammar of the old Germanic dialects. *Twice a week; first semester. One unit.*
Associate Professor WILLIAMS

105. Old High German.—Grammar and interpretation of the oldest literary documents. *Twice a week; second semester. One unit.*
Associate Professor WILLIAMS

110. Early German Drama.—German drama up to the Reformation. *Twice a week; first semester. One unit.* Professor BROOKS

113. German Literature of the Fifteenth and Sixteenth Centuries.—*Twice a week; first semester. One unit.* Professor BROOKS

121. Walther von der Vogelweide.—*Twice a week; second semester. One unit.* Associate Professor WILLIAMS

126. Herder and His Relation to European Literature.—*Twice a week; both semesters. One unit.* Assistant Professor KOLLER

Courses for Graduates and Advanced Undergraduates

19a-19b. Goethe's Faust.—The Faust legend and early Faust books and plays; the genesis of Goethe's *Faust;* reading of both parts. *Twice a week; both semesters.* Professor BROOKS

26a. German Literature up to 1800.—*Three times a week; first semester.* Professor ARON

26b. German Literature since 1800.—*Three times a week; second semester.* Professor ARON

31. Middle High German.—*Twice a week; first semester.* Associate Professor WILLIAMS

GREEK
(See Classics)

HISTORY

Graduate work in history requires two years of college work in this subject, or sixteen semester hours, which should ordinarily include introductory courses in European and American history. Linguistic preparation is important, especially in French and German. For medieval history some knowledge of Latin is essential, and Spanish is useful for certain fields of American history.

Advanced courses in history at the University of Illinois are of three kinds: (1) Courses for information and guidance in general reading. (2) Instruction in methodology, historiography, and bibliography. A part of this work (in course 103) is required of all graduate students in history during their first year. (3) Seminary courses for the study of special fields with a view primarily to training in the methods of historical criticism and research.

Illinois Historical Survey.—Students of history have an opportunity to pursue research in Western history in connection with the Illinois Historical Survey, which is an organization for the purpose of carrying on systematic studies in the history of Illinois.

Attention is also called to the fact that the University of Illinois has for some time cooperated with the Trustees of the State Historical Library in the gathering and editing of archive material. As a result of this relation instructors and graduate students in the department have contributed from time to time to the publications of the Library and have been given useful training in the study of manuscript as well as of printed material.

Higher Degrees in History.—The following statement regarding the specific requirements for higher degrees in history is subject to the general requirements of the Graduate School.

Master of Arts

In addition to meeting the usual tests in the specific courses taken, each candidate for this degree will ordinarily be required to pass a general written ex-

amination early in the year and toward the close of the second semester an examination, also written, in two of the following fields: ancient history; medieval history of continental Europe; modern history of continental Europe; English history; American history; Latin American history. The candidates are expected to have a general knowledge of historical bibliography (see course 103a). The department further requires a working knowledge of one important foreign language, ordinarily French or German.

Doctor of Philosophy

Major Requirements.—A candidate who selects history as his major subject may offer himself for examination in any four of the fields indicated below, stating also the particular field among these four in which he wishes to specialize and in which his thesis is to be written:

1. Ancient history. 2. Medieval history and institutions of continental Europe, to the close of the thirteenth century. 3. Continental Europe from 1300 to 1648. 4. Continental Europe and its dependencies since 1648 (except as included in 5 and 6). 5. The history of England and its dependencies (not including America before 1783). 6. The history of the United States. 7. The history of Latin America. This enumeration of fields is not to be regarded as excluding the possibility of accepting others as may be determined by the department in individual cases.

Minor Subjects.—A candidate for the doctorate in history may select as his first minor one of the divisions of the field of history listed above which is not offered as a part of his major. He should preferably, however, select his minors from subjects offered by other departments. The following list of suitable minors is intended to be suggestive rather than exhaustive or compulsory.

I. In Political Science.—(Any two acceptable for a first minor; any one, for a second minor.) 1. International law and diplomacy. 2. Modern government. 3. Municipal government. 4. Constitutional and administrative law and jurisprudence. 5. Political theory.

II. In Economics and Sociology.—(Any two acceptable for a first minor; any one, for a second minor.) 1. Economic history. 2. Economic theory. 3. Public and private finance. 4. Social reform. 5. Principles of sociology.

III. In Philosophy and Education.—(Any two acceptable for a first minor; any one, for a second minor.) 1. History of ancient and medieval philosophy. 2. History of modern philosophy. 3. History of education.

IV. In Literature.—Some division of the history of literature which may be either comparative literature of a limited period or the literature of a particular country for a more extended period as may be agreed upon in each case.

Courses for Graduates

101. Seminar in American History.—*Two hours, once a week; both semesters. One unit.*

Semester I: Introduction to research in American history.

Professor Robertson

Semester II: Guidance in the investigation of selected topics.

Professor Randall

102. Seminar in English History.—A study of selected topics in the early modern period. *Arrange hours; both semesters. One unit.*

Associate Professor DIETZ

103a-103b. Historiography and Historical Method.—103a is required of all candidates for an advanced degree in history who do not present evidence of similar training elsewhere. *Twice a week; both semesters. One-half unit.*

Associate Professor RANDALL, Assistant Professor SWAIN

104. Seminar in European History.—*Two hours, once a week; both semesters. One unit.*

Semester I: Travels and Travelers in the Near East.

Semester II: The relations of France and Germany in recent times.

Professor LYBYER

105. Research in Special Topics.—Guidance in writing theses for advanced degrees. *One to two units.*

Professors LARSON, LYBYER, ROBERTSON, PEASE; Associate Professors DIETZ, RANDALL; Assistant Professors SWAIN, DUNBAR

106. Seminar in Medieval History.—A study of selected topics in the history of the later middle ages. *Arrange hours, both semesters. One unit.*

Professor LARSON

122. History of the West.—An intensive study of the westward movement, 1760-1816. *Two hours, twice a week; both semesters. One unit.*

Professor PEASE

126. Spain in Europe and America, 1750-1825.—Bibliography, historiography, and topical reports. *Arrange hours; first semester. One unit.*

Professor ROBERTSON

127. Spanish-American Relations.—Relations of the Latin-American nations with the United States. The Monroe Doctrine, intervention, etc. *Arrange hours; second semester. One unit.* Professor ROBERTSON

Courses for Graduates and Advanced Undergraduates

16a-16b. The American Colonies in the Eighteenth Century and the Beginnings of National Life and Organization.—*Three times a week; both semesters.*

Assistant Professor DUNBAR

17a-17b. Social and Economic Forces in the United States in the Nineteenth Century.—*Three times a week; both semesters.* Associate Professor HANSEN

19a-19b. The History of American Immigration.—*Twice a week; both semesters.* Associate Professor HANSEN

21. Recent History of the United States.—*Twice a week; first semester.*

Professor ROBERTSON

25. The Civil War and the Reconstruction.—*Three times a week; first semester.* Associate Professor RANDALL

26. History of the Latin-American Colonies.—*Three times a week; first semester.* Professor ROBERTSON

27. History of Latin America from the Wars of Independence to the Present Time.—*Three times a week; second semester.* Professor ROBERTSON

29. America and Europe.—A study of the foundations of international intercourse in the later eighteenth and the early nineteenth century with particular reference to the Latin-American colonies and states. *Three times a week; second semester.* Professor ROBERTSON

30a-30b. The Mohammedan World.—*Three times a week; both semesters.* Professor LYBYER

32a-32b. The History of Europe, 1848-1928.—*Three times a week; both semesters.* Professor LYBYER

34a-34b. The History of Europe, 1648-1848.—*Three times a week; both semesters.* Assistant Professor SWAIN

38a-38b. Development of the French Monarchy in Early Modern Times, 1285-1648.—*Three times a week; both semesters.* (Not given in 1929-30). Associate Professor JONES

39a-39b. The Renaissance and the Reformation.—The transition from medieval to modern ideals. *Three times a week; both semesters.* Associate Professor JONES

44a-44b. Constitutional History of England.—*Three times a week; both semesters.* Professor LARSON

46a-46b. The Industrial Revolution and English Social Politics, 1750-1928.—*Three times a week; both semesters.* Associate Professor DIETZ

48. Medieval Institutions: Social, Political, and Economic.—*Twice a week; second semester.* Professor LARSON

52. The Hellenistic Age.—*Three times a week; first semester.* (Not given in 1929-30).

57. The Roman Empire.—Special attention will be devoted to the organization and administration of the empire, the life in the provinces, the progress of the Oriental Religions, and the relations of the empire to Christianity. *Three times a week; second semester.* (Not given in 1929-30).

60. The United States in the Great War.—*Three times a week; second semester.* Associate Professor RANDALL

62a-62b. Constitutional History of the United States.—*Three times a week; both semesters.* Associate Professor RANDALL

HOME ECONOMICS

Students electing graduate courses dealing with food and nutrition will present chemistry, 20 hours (including quantitative and organic); bacteriology, 5 hours; physiology, 5 hours; food and dietetics, 10 hours; nutrition, 2 to 5 hours. For the more general problems involved in 101, students must present food and dietetics, 10 hours; textiles and clothing, 8 hours; chemistry, 12 hours; physiology, 5 hours; principles of economics, 3 hours.

Courses for Graduates

101. Home Economics.—Each member of the class selects a problem for continuous work and report. *Twice a week; both semesters. One unit.*
Professor WARDALL

102. Research in Food and Nutrition.—*Twice a week; both semesters. One-half to three units.* Assistant Professor HETLER

103. Nutrition Seminar.—Students registering for this course should have a reading knowledge of French or German. *Once a week; both semesters. One-half unit.* Assistant Professor HETLER

Courses for Graduates and Advanced Undergraduates

20. Infant Nutrition.—*Twice a week; second semester.*
Assistant Professor HETLER, Miss PLANT

28. Organization and Management of the Household.—*Twice a week; second semester.* Assistant Professor KELLOGG

31. Clothing.—*Three times a week; second semester.*
Assistant Professor JACOBSEN, Miss WHITLOCK

33. Diet in Disease.—*Three times a week; both semesters.*
Assistant Professor BARTO

35. Experimental Cookery.—*Three times a week; second semester.*
Miss SCHRIEBER

39a-39b. Readings in Food and Nutrition.—*Once a week; both semesters.*
Assistant Professors HETLER and BARTO

41. Problems in Nutrition.—*Three to five times a week; second semester.*
Assistant Professor HETLER, Miss PLANT

43a-43b. Problems in Textiles and Clothing.—*Three times a week; both semesters.* Assistant Professor JACOBSEN;
Misses WEAVER, WHITLOCK, MCCULLOUGH, BARNES

45. Nutrition Classes.—*Twice a week; second semester.*
Assistant Professor BARTO, Miss KING

48. Institutional Dietaries and Administration.—*Three times a week; second semester.* Assistant Professor SMITH

50. Costume Design.—*Three times a week; second semester.* Miss BARNES

51. Textiles.—*Twice a week; second semester.* Miss MCCULLOUGH

55. Food and Nutrition.—*Five times a week; first semester.*
Assistant Professor HETLER, Miss PLANT

56. Child Care and Training.—*Twice a week; second semester.*
Assistant Professor WALLS

57a-57b. Problems in Household Management.—*Three times a week; both semesters.* Assistant Professor KELLOGG

HORTICULTURE

At least twenty hours of collegiate work in horticulture and allied subjects and specific preparation for the chosen topics are required for entrance on major work in this department.

Students desiring to specialize in plant breeding (or animal breeding) are referred to the Zoology Department for the fundamental courses in Genetics.

Courses for Graduates

103. Olericulture.—*Both semesters. One to two units.* Professor LLOYD

108. Pomology.—*Both semesters. One to two units.*
Professors BLAIR, LLOYD, DORSEY, RUTH; Associate Professor ANDERSON

115. Floriculture.—*Both semesters. One to two units.*
Professor DORNER; Assistant Professor WEINARD

Courses for Graduates and Advanced Undergraduates

12. Evolution of Horticultural Plants.—*Three times a week; first semester.*
Professor DORSEY

18. Experimental Horticulture.—For advanced students preparing for experiment station work. *Three times a week; second semester.* Professor DORSEY

43. Greenhouse Fertilizers.—*Three times a week; first semester.*
Assistant Professor WEINARD

44. Pomology Seminar.—For seniors and graduates specializing in pomology. *Once a week; both semesters.* Professor RUTH

45. Plant Nutrition.—*Three times a week; second semester.*
Assistant Professor WEINARD

46. Marketing Horticultural Products.—Required inspection trip, expenses about $20. For seniors and graduates specializing in horticulture. *Three times a week; first semester.* Professor LLOYD

47. Fruit Production and Storage.—The effects of environment upon fruit trees and fruits. The storage of fruits. *Three times a week; first semester.*
Professor RUTH

51. Fruit Diseases.—*Three times a week; second semester.*
Associate Professor ANDERSON

LIBRARY SCIENCE

Candidates for the Master's degree in Library Science must have completed at least thirty semester hours' work in Library Science in this institution or in an approved institution.

Students desiring to prepare for work in special types of libraries will be expected to include at least one unit of advanced courses in appropriate subjects other than Library Science. All such changes in the program of the student must be approved by the Director of the Library School.

Courses for Graduates

101. Thesis.—*One to two units.*
Professor WINDSOR; Associate Professor SIMPSON, and others

102. Seminar.—Special topics in library administration and history, and in bibliography. *Once a week; both semesters. One unit.*
Professor WINDSOR; Associate Professor SIMPSON, and others

103. Advanced Reference Problems.—Transactions of societies; government publications; periodicals and indexes. *Twice a week; first semester. One-half unit.* Associate Professor SIMPSON

104. Advanced Cataloging and Classification.—Systems of book classification; comparative rules for cataloging books; bibliographical institutions. *Twice a week; second semester. One-half unit.* Assistant Professor BOND

Courses for Graduates and Advanced Undergraduates

7. History of Libraries.—The foundation, development, and resources of the leading libraries of Europe and the United States. *Twice a week; second semester.* (Not given 1929-30). Associate Professor SIMPSON

9. History of Books and Printing.—History of the early forms of books; the invention and spread of printing; the book trade; book-binding. *Twice a week; second semester.* Professor WINDSOR

13a. Public Documents.—Publications of United States government and their use as sources of information. *Twice a week; first semester.*
Assistant Professor BOYD

24a-24b. Selection of Books.—Foreign fiction; drama; poetry; special problems in selection. *Twice a week; both semesters.* Miss HOSTETTER

26b. Library Administration.—Library organization; work with children; special topics. An inspection trip to libraries and book-publishing houses, requiring about one week and costing approximately $30. *Three times a week; second semester.* Miss GRAMESLY and others

42. Public Documents.—Publications of American states and municipalities; publications of foreign governments. *Three times a week; second semester.*
Assistant Professor BOYD

43. High School Library Administration.—*Twice a week; second semester.*
Miss HOSTETTER

44. Bookbuying for Large Libraries.—The problems in book purchase which must be met in the order departments of large libraries. *Twice a week; first semester.* Miss GARVER

45. Library Buildings.—The planning of library buildings and the selection of equipment with special emphasis on the administrative aspects. *Twice a week; first semester.* Professor WINDSOR; Miss GRAMESLY

MATHEMATICS

Students entering on graduate study with a major in mathematics must have had twenty-five hours of undergraduate work in mathematics, including a one-year course in calculus and one advanced course such as a course in theory of equations, or in differential equations. They should be able to read German and French.

Candidates for a doctor's degree taking a first minor in mathematics are expected to have completed a course in calculus and are required to take two one-year courses beyond the calculus; candidates for a doctor's degree taking a second minor are required to complete at least one course throughout a year beyond the calculus.

The courses offered by the department are arranged in cycles of two or of three years, so that a student will have opportunity to take any particular course offered by the department, for which he is qualified, in three years of residence required for the doctor's degree.

Courses for Graduates

100. Seminar.—*Three times a week; both semesters. One to two units.* Professors TOWNSEND, MILLER, SHAW, CARMICHAEL, EMCH, COBLE; Associate Professor CRATHORNE; Assistant Professors LYTLE, LEVY, BRAHANA, GREEN, MARIA

101. Functions of Real Variables.—*Three times a week; both semesters. One unit.* (To be given in 1930-31). Professor TOWNSEND

102. Functions of a Complex Variable.—*Three times a week; both semesters. One unit.* Professor TOWNSEND

110. Elliptic Functions.—*Three times a week; both semesters. One unit.* Professor CARMICHAEL

112. Linear Difference Equations.—*Three times a week; both semesters. One unit.* (To be given 1931-32). Professor CARMICHAEL

113. Linear Differential Equations.—*Three times a week; both semesters. One unit.* (To be given in 1930-31). Professor CARMICHAEL

122. Modern Algebra.—*Three times a week; both semesters. One unit.* Assistant Professor MARIA

124. The Theory of Numbers.—First semester: Theory of congruences and residues. Second semester: Theory of algebraic numbers. *Three times a week; both semesters.* (To be given in 1930-31). Assistant Professor HAZLETT

126. Theory of Groups.—Introductory course. *Three times a week; both semesters. One unit.* Professor MILLER

127. Theory of Groups.—Advanced course. *Three times a week; both semesters. One unit.* (To be given 1930-31). Professor MILLER

129. Theory of Statistics.—The mathematical theory underlying statistics with applications to problems in economics, biology, and sociology. *Three times a week; both semesters. One unit.* Associate Professor CRATHORNE

131. Advanced Algebraic Geometry.—*Three times a week; both semesters. One unit.* Professor EMCH

132. Analytic Projective Geometry.—*Three times a week; both semesters. One unit.* Professor COBLE

133. Geometric Transformations.—*Three times a week; first semester. One unit.* Assistant Professor BRAHANA

134a. Foundations of Geometry.—*Three times a week; second semester. One unit.* Assistant Professor BRAHANA

135. Metric Differential Geometry.—*Three times a week; first semester. One unit.* Assistant Professor LEVY

136. Projective Differential Geometry.—*Three times a week; second semester. One unit.* Assistant Professor LEVY

138. Algebraic Geometry and Related Function Theory.—*Three times a week; both semesters. One unit.* (To be given in 1930-31). Professor COBLE

139. Analysis Situs.—*Three times a week; both semesters. One unit.* (To be given in 1930-31). Assistant Professor BRAHANA

141. Vector Methods.—*Three times a week; both semesters. One unit.* Professor SHAW

143. Linear Algebra.—*Three times a week; both semesters. One unit.* (To be given in 1930-31). Professor SHAW

145. Linear Operations.—*Three times a week; both semesters. One unit.* (To be given in 1931-32). Professor SHAW

Courses for Graduates and Advanced Undergraduates

10. Theory of Equations and Determinants.—*Three times a week; first semester.* Dr. HOPKINS

16-17. Differential Equations and Advanced Calculus.—*Three times a week; both semesters.* Dr. BAILEY, Dr. STEIMLEY

18. Constructive and Projective Geometry.—*Three times a week; second semester. One unit.* Dr. OGG

20. Graphical and Numerical Methods.—*Three times a week; second semester.* Assistant Professor GREEN

21. Theory of Probability.—*Three times a week; second semester.* Associate Professor CRATHORNE

22. Statistics.—May be counted only toward a minor in mathematics. *Three times a week; first semester.* Associate Professor CRATHORNE

24. Mathematical Theory in Aeronautics.—*Twice a week; second semester.* Assistant Professor GREEN

30-31. Actuarial Theory.—*Three times a week; both semesters.* Associate Professor CRATHORNE

32. History of Mathematics.—*Three times a week; second semester.* (To be given in 1930-31). Assistant Professor LYTLE

35. Teachers' Course.—May be counted only toward a minor in mathematics. *Three times a week; first semester.* Assistant Professor LYTLE

40. Fundamental Concepts of Mathematics.—*Three times a week; second semester.* Assistant Professor LYTLE

91. Introduction to Modern Mathematics.—*Three times a week; both semesters.* Professors COBLE, CARMICHAEL

MECHANICAL ENGINEERING

The prerequisite for graduate work in mechanical engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in mechanical engineering in the branches of the subject in which registration is desired.

Courses for Graduates[1]

107. Thermodynamics and Heat Motors.—*Twice a week; both semesters. One unit.* Professor GOODENOUGH

109. Mechanical Engineering Design.—*Twice a week; either semester. One unit.* Professor LEUTWILER

112. Laboratory Investigations.—*Three times a week; both semesters. One and one-half units.*

Professors WILLARD, KRATZ, POLSON, and Associate Professor MACINTIRE

MECHANICS, THEORETICAL AND APPLIED

The prerequisite for the courses for graduates in theoretical and applied mechanics is the equivalent of the undergraduate courses in theoretical and applied mechanics and in allied engineering subjects required for the degree of Bachelor of Science in engineering.

Courses for Graduates

101. Analytical Mechanics.—*Twice a week; first semester. One unit.* Professor MOORE

[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other departments.

102. Resistance of Materials.—*Twice a week; second semester. One unit.*
Professor MOORE

103. Hydraulics and Hydraulic Engineering.—*Twice a week; second semester. One unit.* Professor ENGER

104. Experimental Work in Laboratory of Applied Mechanics.—*Twice a week; both semesters. One to two units.*
Professors MOORE, ENGER, and Associate Professor RICHART

105. Experimental and Analytical Work in Reinforced Concrete.—*Twice a week; both semesters. One to two units.* Associate Professor RICHART

106. Theory of Elasticity and Applications to Engineering Problems.—*Three times a week; both semesters. One unit.* Professor WESTERGAARD

Courses for Graduates and Advanced Undergraduates[1]

41. Advanced Mechanics of Materials.—*Three times a week; first semester.*
Professor SEELY

42. The Properties of Engineering Materials; Specifications and Inspection.—*Twice a week; second semester.* Professor SEELY

43. Laboratory Work in Hydraulics.—*Twice a week; first semester.*
Professor ENGER

44. Laboratory Work in Testing Materials.—*Three times a week; second semester.* Professor MOORE

45. Advanced Statics.—*Three times a week; first semester.*
Professor WESTERGAARD

46. Advanced Statics.—*Twice a week; second semester.*
Professor WESTERGAARD

METEOROLOGY

(See Geology)

MINERALOGY

(See Geology)

MINING ENGINEERING

The prerequisite for graduate work in mining engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in mining in the branches of the subject in which registration is desired.

In addition to the regular University laboratories, the laboratory connected with the investigation of mining conditions in Illinois now being carried on

[1]Other courses offered Senior students are open for minor credit to students majoring in other departments.

jointly by the Engineering Experiment Station through the Department of Mining Engineering and the State Geological Survey is available for graduate instruction.

Courses for Graduates

101. Advanced Mining Practice.—*Twice a week; either semester. One unit.* Professor CALLEN

102. Advanced Preparation of Coal and Ores.—*Twice a week; first semester. One unit.* (Not given in 1929-30).

104.[1] **Mining Reports.**—*Twice a week; either semester. One unit.* Professor CALLEN

105.[1] **Welfare Work and Education Among Mine Employees.**—*Twice a week; either semester. One unit.* Professor CALLEN

106. Advanced Coal, Ore, and Metallurgical Plant Design.—*Twice a week; either semester. One unit.* (Not given in 1929-30.)

107. Advanced Non-Ferrous Metallurgical Projects.—*Twice a week; either semester. One unit.* (Not given in 1929-30).

Courses for Graduates and Advanced Undergraduates

6. Mechanical Engineering of Mines.—*Three times a week; second semester.* Professor CALLEN

8. Mine Administration.—*Three times a week; first semester.* Mr. MITCHELL

9. Preparation of Coal and Ores.—*Three times a week; first semester.* Mr. MITCHELL

16. Non-Ferrous Ore Treatment.—The reduction of gold, silver, copper, lead and zinc ores. *Five times a week; second semester.* Mr. MITCHELL

15. Mine Ventilation.—*Twice a week; first semester.* Professor CALLEN

20. Mine Ventilation Laboratory.—*Twice a week; first semester.* Professor CALLEN

21. Mine Examination and Valuation.—*Three times a week; second semester.* Mr. NICHOLSON

41. Principles of Mining and Metallurgical Design.—*Three times a week; first semester.* Mr. MITCHELL

42. Mining and Metallurgical Design.—*Twice a week; second semester.* Mr. MITCHELL

64. Mining Laboratory.—*Three times a week; second semester.* Mr. MITCHELL

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[1]Of courses 104 and 105 only one will be given either semester, according to election of students.

PHILOSOPHY

Students who enter on graduate work with philosophy as their major subject must have had a general course in the history of philosophy, a course in logic, and a general course in psychology.

Courses for Graduates

103. Ethics.—*Twice a week; first semester. One unit.* Professor DANIELS

105. Seventeenth Century Continental Thought.—*Twice a week; second semester. One unit.* Professor DANIELS

106. English and American Idealism.—*Twice a week; second semester. One unit.* Professor MORROW

108. Plato.—*Twice a week; first semester. One unit.* Professor MCCLURE

110. Locke, Berkeley, Hume.—*Twice a week; first semester. One unit.* Professor MORROW

112. German Idealism.—*Twice a week, second semester. One unit.* Professor MCCLURE

114. Theory of Knowledge.—*Twice a week; first semester. One unit.* Assistant Professor BENJAMIN

Courses for Graduates and Advanced Undergraduates

3. History of Ancient and Medieval Philosophy.—*Three times a week; first semester.* Professor MCCLURE

4. History of Modern Philosophy.—*Three times a week; second semester.* Professor MCCLURE

7. Ethics.—*Three times a week; second semester.* Professor MORROW

9. Political and Social Ethics.—*Three times a week; first semester.* Professor MORROW

10. Principles and Concepts of Science.—*Three times a week; first semester.* Assistant Professor BENJAMIN

PHYSICS

The prerequisite for graduate work in physics is a college course in general physics with a one-year laboratory course in introductory physical measurements. The student who is to do major work in physics should also have had additional courses in physics or teaching experience, unless the training in his minor subjects, mathematics or chemistry, has been strong and complete. He should also have a knowledge of French and German sufficient to use references in these languages. The courses named below are those open for candidates for the master's or doctor's degree. A large part of the last year's work of the candidate for the doctor's degree is investigational, along either the experimental or the theoretical side of physics. In addition to these major graduate

courses, the courses in elementary dynamics, heat, light, electrical measurements, and introductory electrical theory are arranged with certain additions for the graduate credit. The intermediate courses on electricity and magnetism, heat and light (Physics 15, 16, 17) may be offered with certain additions by candidates for the master's degree and then generally only as minors.

Courses for Graduates

104a-104b. Electrical and Magnetic Measurements.—*Two times a week of three hours each; both semesters. Three-fourths or one unit.* (Courses 104a and 104b are recommended for graduate students in chemistry.)
Professor KNIPP; Assistant Professor WILLIAMS; Dr. SANDERS

120. Light.—Advanced theories and applications in geometric and physical optics. Lectures, assigned readings and recitations, with laboratory experiments. *Both semesters. One to two units.*
Associate Professor SCHULZ; Assistant Professor PATON

121. Recent Advances in Physics and the Electron Theory.—This will be in conjunction with 124a. *First and second semesters. One-half to one unit.*
Professor KNIPP

123. Sound.—*Twice a week; both semesters. One-half to one unit.*
Professor WATSON

124a. Conduction of Electricity Through Gases.—*Three times a week; first semester. One unit.* Professor KNIPP

125. Architectural Acoustics.—Theoretical and experimental investigations on the acoustics of buildings. *Twice a week; both semesters. One-half to one unit.* Professor WATSON

126. Physics Colloquium.—Attendance is expected of all the graduate students. *Once a week; both semesters. No credit.*

127a-b. Recent Problems in Physics.—Wave mechanics, atomic structure and Spectrum Lines. *Twice a week; both semesters. One-half unit.*
Professor KUNZ

128. Some Problems and Methods in Theoretical Physics.—*Three times a week; first or second semester. One unit.* Assistant Professor LIBMAN

131. Investigation of Special Problems.—*Two to four times a week; both semesters. One to two units.*
Professors CARMAN, KNIPP, WATSON; Associate Professor SCHULZ; Assistant Professors WILLIAMS, PATON

132a. Dynamics.—*Four times a week; both semesters. One unit.* (Not given in 1929-30). Professor KUNZ

132b. Electrodynamics.—*Four times a week; both semesters. One unit.*
Professor KUNZ

132c. Hydrodynamics.—Especially theory of flowing fluids and gases. *Four times a week; both semesters. One unit.* (Not given in 1929-30).
Professor KUNZ

132d. Electric Oscillations.—*Twice a week; both semesters. One-half unit.* (Not given in 1929-30). Professor KUNZ

132e. Thermodynamics and Kinetic Theory of Matter.—*Three times a week; both semesters. One unit.* Assistant Professor LIBMAN

132f. Theory of Elasticity.—*Three times a week; second semester. One unit.* (Not given in 1929-30). Professor KUNZ

133. Seminar.—*Three or five times a week; both semesters. One to three units.* Professors CARMAN, KNIPP, WATSON, KUNZ; Associate Professor SCHULZ

Courses for Graduates and Advanced Undergraduates

44a-44b. Electrical and Magnetic Measurements.—*Twice a week; both semesters.* Professors KNIPP, WILLIAMS, SANDERS

14a. Introduction to Theoretical Physics.—Dynamics.—*Twice a week; first semester.* Dr. SANDERS

15. Electricity and Magnetism.[1]—Recommended to students in non-technical courses who wish a knowledge of electricity and magnetism beyond the course in general physics. *Two recitations or lectures and one three-hour laboratory exercise weekly; second semester.* Dr. SANDERS

16. Heat.—*Three times a week; second semester.*
Assistant Professor LIBMAN

17a-b. Light.[1]—*Three times a week; both semesters.*
Assistant Professor PATON

20a-b. Light.—Special phenomena and applications. *Three times a week; both semesters.* Associate Professor SCHULZ

22a-b. Special Light Measurements.—*Twice a week; both semesters.*
Associate Professor SCHULZ

23. Sound.—*Three times a week; first semester.* Professor WATSON

24. Properties of Matter.—Heat conduction; capillarity and surface phenomena; introduction to potential theory and wave motion. *Three times a week; first semester.* Assistant Professor LIBMAN

27. Fundamental Physical Measurements.—*Once or twice a week; first and second semesters. One-half to one unit.* Assistant Professor LIBMAN

30. Introduction to Theoretical Electricity.—For advanced students in physics, chemistry, mathematics, and engineering. *Three times a week; second semester.* Assistant Professor WILLIAMS

[1]This course may be taken for a minor credit or as *first* year major credit only.

33. Sound.—The theory of sound as given in Physics 23 should be taken with this course. *Once a week; first semester.* Professor WATSON

45. Principles of Radiation.—*Twice a week; both semesters.*
Assistant Professor PATON; Dr. SANDERS

46a-b. Advanced Electrical Measurements.—*Two times a week of three hours each; both semesters. Three-fourths unit.*
Assistant Professor WILLIAMS

50. Theory and Use of Optometric and Other Optical Instruments.—*Four times a week; first semester.* Associate Professor SCHULZ

PHYSIOLOGY

The prerequisites for graduate work in physiology are Physiology 1 or 4, 2 and 6 or equivalent.

Courses for Graduates

101. Journal Club.—Review of literature. *Both semesters. One-fourth unit.*
Associate Professor BURGE

102. Research.—*Both semesters.* One to two units.
Associate Professor BURGE

103. Special Phases of the Physiology of Respiration, Circulation, Digestion, Metabolism, Excretion, Secretion, Glands of Internal Secretion, Nervous System.—*Both semesters. One-half to one unit.* Associate Professor BURGE

Courses for Graduates and Advanced Undergraduates

7. Advanced Mammalian Physiology.—*Three times a week; first semester.*
Associate Professor BURGE

POLITICAL SCIENCE

Graduate work in political science is conducted in the following special fields: (1) political theory; (2) international law and diplomacy; (3) modern government; (4) constitutional law, administrative law, and jurisprudence; (5) municipal administration.

To be admitted to take political science as a major subject, the student must have done at least 18 hours of undergraduate work in political science, economics, and history, not less than nine hours of which have been in political science. To take political science as a minor he must have had at least nine hours' work in these fields, including six hours in political science.

If a student making political science his major is taking both of his minors in other departments, one of them must be in history, economics, or sociology.

Several courses given in other departments are so closely related to those in political science that graduate students whose major is political science may be permitted on petition to take such courses as part of their major work. At-

tention is called to the courses in public law in the College of Law, the courses in city planning given by the department of horticulture, and the technical courses in municipal and sanitary engineering in the College of Engineering.

Courses for Graduates

101. History of Political Theories.—*Three times a week; first semester. One unit.* Professor GARNER

102. The Nature of the State.—*Twice a week; second semester. One unit.* Professor FAIRLIE

103. Seminar in Political Science and Public Law.—*Once a week; both semesters.* Members of the department

104. Municipal Administration.—*Twice a week; first semester. One unit.* Professor FAIRLIE

105. The American Constitutional System.—*Twice a week; first semester. One unit.* Professor MATHEWS

106a. Special Topics in International Law.—Research course. *Twice a week; first semester. One unit.* Professor GARNER

106b. Special Topics in International Law.—Research course. *Twice a week; second semester. One unit.* Professor GARNER

107. Foreign Relations of the United States.—*Twice a week; first semester. One unit.* (Not given in 1929-30). Professor MATHEWS

112. Public Administration.—Studies in national or local administration in the United States. *Once a week; second semester. One unit.* Professor FAIRLIE

113. State Government and Administration.—*Twice a week; second semester. One unit.* (Not given in 1929-30) Professor MATHEWS

114. Studies in Political Parties.—*Twice a week; second semester. One unit.* Assistant Professor BERDAHL

Courses for Graduates and Advanced Undergraduates

4. Municipal Government.—*Three times a week; first semester.* Professor FAIRLIE

5. Constitutional Law of the United States.—*Three times a week; second semester.* Professor MATHEWS

6a. International Law: Law of Peace.—*Three times a week; first semester.* Professor GARNER

6b. International Law: Law of War and Neutrality.—*Three times a week; second semester.* Professor GARNER

7. American Diplomacy.—*Three times a week; first semester.* Professor MATHEWS

8. International Organization.—*Twice a week; second semester.* Assistant Professor BERDAHL

9. Principles of Jurisprudence.—*Three times a week; second semester.* Professor FAIRLIE

10. Administrative Law.—*Twice a week; second semester.* (Not given in 1929-30). Professor FAIRLIE

11. Constitutional Aspects of Social and Industrial Problems.—*Three times a week; second semester.* (Not given in 1929-30). Assistant Professor BERDAHL

12. National Administration in the United States.—*Three times a week; first semester.* Professor FAIRLIE

13. State Administration in the United States.—*Three times a week; second semester.* (Not given in 1929-30). Professor MATHEWS

14a. Political Parties: Party History and Issues.—*Three times a week; first semester.* (Not given in 1929-30; alternates with Political Science 14b). Assistant Professor BERDAHL

14b. Political Parties: Party Organization and Methods.—*Three times a week; first semester.* (Alternates with Political Science 14a). Assistant Professor BERDAHL

17. Judicial Organization and Administration.—*Twice a week; first semester.* (Not given in 1929-30). Professor MATHEWS

18. Legislation in the United States.—*Three times a week; second semester.* (Not given in 1929-30).

21. British Government.—*Twice a week; first semester.* Professor FAIRLIE

22. Continental European Governments.—The political systems of France, Germany, Italy, Switzerland, and Russia. *Three times a week; second semester.* Professor GARNER

27. Public Opinion.—A study of motives as causal factors in the genesis of political practices. *Three times a week; first semester.* Dr. CASEY

28. Problems of Contemporary Politics.—A survey of factors of major importance in domestic and foreign politics. *Three times a week; second semester.* Dr. CASEY

34. Municipal Problems.—Municipal administration in the United States and Europe. *Three times a week; second semester.* Professor FAIRLIE

PSYCHOLOGY

Graduate students who elect psychology as their major subject must have had standard courses, of university grade, both in general psychology and in the psychological laboratory. One general university course is the minimal requirement for graduate students who apply to the department for a minor subject.

102. Translation of Psychological Treatises.—Critical reading of French and German books and articles. *Both semesters. One-half unit.*
Professor Woodrow

103. Research.—Experimental investigations. *Both semesters. One-half to two units.* Professor Woodrow; Associate Professors Culler, Young

105. Seminar.—Discussion of current topics in their historical setting, with especial emphasis upon research problems. *Both semesters. One unit.*
Professor Woodrow

106. Neural Theory of the Psychological Functions.—*Second semester. One unit.* Associate Professor Culler

107. Psychological Theory.—The postulates of contemporary psychology. *First semester. One unit.* Associate Professor Young

108. Quantitative Methods.—The logic of research methods in psychology. *First semester. One unit.* Associate Professor Culler

Courses for Graduates and Advanced Undergraduates

4. Psychological Measurements.—The metric and correlational methods. *Twice a week; second semester.* Associate Professor Culler

5. Comparative Psychology.—Psychological implications of organic evolution; human and animal experience. (Recommended to students who intend to pursue advanced courses either in animal psychology or in the study of behavior.) Lectures; laboratory. *Twice a week; first semester.*
Assistant Professor Higginson

8. Feeling and Emotion.—A critical analysis of the facts, problems, and methods of affective psychology, with special reference to recent psychological studies. *Twice a week; second semester.* Associate Professor Young

11. Learning and Comprehension.—Processes and functions in acquiring new knowledge and skill. *Twice a week; second semester.*
Associate Professor Culler

12-13. Minor Problems (Advanced Laboratory).—Application of methods suitable to new problems in general and comparative psychology. *Three times a week; both semesters.*
Professor Woodrow; Assistant Professor Higginson; Dr. Sullivan

14. Social Psychology.—Socialization viewed from the standpoint of the group and of the individual member. Socialization of psychological functions. Conflict and adjustment. *Three times a week; second semester.* Dr. Sullivan

16. Genetic Psychology.—*Twice a week; first semester.* Dr. Sullivan

17. The History of Psychology.—*Three times a week; second semester.* (Not given in 1929-30).

18. **Perception.**—Perceptual experience; recent revisions of perceptual theory including the doctrine of the *Gestalt*. Lectures and discussions. *Twice a week; first semester.* Associate Professor CULLER

20. **Systematic Psychology.**—A critical study of contemporary systems: behaviorism, *Gestalt psychologie*, purposive and functional psychology. For seniors and graduates. *Twice a week; second semester.* Professor WOODROW

30. **Attention.**—Lectures and discussions. *Twice a week; second semester.* Dr. MÖLLER

34. **Individual Differences.**—Variations in mental traits such as attention, free association, intelligence, and personality; description, significance, theory of measurement and causation. *Three times a week; first semester.* Professor WOODROW

RAILWAY ENGINEERING

The prerequisite for graduate work in railway engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in railway engineering in the branch of the subject in which registration is desired.

Courses for Graduates

102. **Locomotive Design.**—*Once a week; both semesters. One unit.* Professor YOUNG

106. **Locomotive Operation.**—*Once a week; both semesters. One unit.* Professor SCHMIDT

110. **Railway Location.**—*Once a week; both semesters. One unit.* Professor KING

Courses for Graduates and Advanced Undergraduates

3. **Locomotives.**—*Twice a week; first semester.* Mr. SCHRADER

4. **Locomotives.**—*Three times a week; second semester.* Mr. SCHRADER

33. **Economic Theory of Railway Location.**—*Four times a week; second semester.* Professor KING

62-64. **Electric Railway Laboratory and Practice.**—*Five times a week; first semester.* Assistant Professor TUTHILL

70-74. **Electric Railway Design and Economics.**—*Five times a week; second semester.* Assistant Professor TUTHILL

ROMANCE LANGUAGES AND LITERATURES

Before entering on the study of Romance languages as a major for the degree of A.M., the candidate must have had at least (a) three years of college work

in one Romance language, together with a satisfactory reading knowledge of another; or (b) two years of college work in each of two Romance languages. In either case a reading knowledge of German is highly desirable. Before being accepted as a recognized candidate for the degree of Ph.D., he must have had in addition, satisfactory training in Latin, and must be able to read ordinary German prose. Before entering on the study of Romance languages as a first or second minor, the candidate must have had two years of college work in the language desired.

FRENCH

Courses for Graduates

101. Old French Literature.—*Twice a week; both semesters. One unit.* Professor OLIVER

102. Villon, Rabelais, Montaigne, la Pléiade.—(In French). *Once a week; both semesters. One-half unit.* (Not given in 1929-30).

103. Seventeenth Century Prose Writers.—*Twice a week; both semesters. One unit.* (Not given in 1929-30). Professor OLIVER

104. Eighteenth Century Prose Writers.—*Twice a week; both semesters. One unit.* Professor OLIVER

106. La Fontaine et les Fables.—Sources, analyse critique et stylistique. (In French). *Once a week; both semesters. One-half unit.* (Not given in 1929-30).

127. French Romanticism.—*Twice a week; both semesters. One unit.* Professor CARNAHAN

128. Origin and Development of the Novel in France.—*Twice a week; both semesters. One unit.* Professor CARNAHAN

129. Special Problems in French Romanticism.—*Once a week; both semesters. One-half to one unit.* Professor CARNAHAN

142. Cours d'Explication Française.—Lecture méthodique et analytique du point de vue de la langue, du style, des idées et des sources de textes illustrant l'histoire de la littérature française. (In French). *Twice a week; both semesters. One unit.* (Not given in 1929-30).

143. Littérature Française Contemporaine.—Etude des influences sociales, artistiques, philosophiques et scientifiques sur le mouvement littéraire de 1880 environ jusqu'à nos jours. (In French). *Twice a week; both semesters. One unit.* (Not given in 1929-30).

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of French Literature.—*Three times a week; both semesters.* Professor CARNAHAN, Dr. PALFREY, Dr. JACOB

11. Selected Topics from the History of French Literature.—(Open to students who have had or are taking French 10, or the equivalent). *Twice a week; both semesters.* (Not given in 1929-30).

17a-17b. French Drama of the Nineteenth and Twentieth Centuries.—*Twice a week; both semesters.* Assistant Professor HAMILTON

24a-24b. French Drama of the Seventeenth and Eighteenth Centuries.—*Three times a week; both semesters.* Professor OLIVER

29a-29b. French Lyric Poetry.—*Twice a week; both semesters.* Dr. PALFREY

32a-32b. Le Roman et la Nouvelle au 19ème et au 20ème Siècles.—(In French). *Three times a week; both semesters.* Dr. JACOB

ITALIAN

Courses for Graduates

140. Italian Literature of the Thirteenth and Fourteenth Centuries. Dante, Petrarch, Boccaccio.—*Twice a week. One unit.* (Not given in 1929-30). Associate Professor VAN HORNE

143. Italian Literature of the Fifteenth and Sixteenth Centuries.—*Twice a week. One unit.* (Not given in 1929-30). Associate Professor VAN HORNE

146. Modern Italian Literature.—*Twice a week; both semesters. One unit.* (Not given in 1929-30). Associate Professor VAN HORNE

SPANISH

Courses for Graduates

132. The Novela of the Golden Age.—*Twice a week; both semesters. One unit.* (Not given in 1929-30). Professor FITZ-GERALD

133. The Origin of the Spanish Novela and of the Comedia.—*Twice a week; both semesters. One unit.* Professor FITZ-GERALD

135. The Modern Novel in Spain.—*Twice a week; both semesters. One unit.* Assistant Professor HAMILTON

138. Spanish-American Literature.—*Twice a week; both semesters. One unit.* (Not given in 1929-30). Associate Professor VAN HORNE

139. Spanish Literature in the Middle Ages.—*Twice a week; both semesters. One unit.* (Not given in 1929-30). Professor FITZ-GERALD

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of Spanish Literature.—*Three times a week; both semesters.* Assistant Professor HAMILTON

11a-11b. Spanish Drama of the Sixteenth and Seventeenth Centuries.—*Twice a week; both semesters.* Dr. LUNDEBERG

17a-17b. Modern Spanish Drama.—*Twice a week; both semesters.* Assistant Professor HAMILTON

ROMANCE PHILOLOGY

Courses for Graduates

171. Introduction to Romance Philology.—*Twice a week; both semesters. One unit.* Professor FITZ-GERALD

175. Old French Phonology and Morphology.—*Twice a week; both semesters. One unit.* Professor OLIVER

185. Oldest Monuments of the Spanish Language; Palaeography; Origins of Spanish Poetry.—*Twice a week; both semesters. One unit.* Professor FITZ-GERALD

195. Seminar.—Research work in preparation for theses in the field of Romance languages. *Both semesters. One to two units.* Members of the Department

SOCIOLOGY

Preparation for major graduate work in sociology must include at least the equivalent of twenty-three semester hours in the social and biological sciences, of which at least eight must be in sociology. The remaining fifteen hours may be distributed among economics, philosophy, history, psychology, political science and biology (heredity). A thesis is required of all candidates for the master's and the doctor's degrees. Preparation for graduate work in sociology as a minor requires at least six hours of credit in sociology. Two units will be accepted for a first minor for the master's degree.

Theses subjects may be chosen from any one of the following divisions of the sociological field: general and historical sociology; personality studies; culture theory and culture change; population studies; community studies; social pathology and social adjustment.

Courses for Graduates

100. Sociological Theory.—*Twice a week; first semester. One-half to one unit.* Assistant Professor HILLER

102a. Earlier Developments in Sociology.—*Twice a week; first semester. One unit.* (Not given in 1929-30). Professor ————

102b. More Recent Developments in Sociology.—*Twice a week; second semester. One unit.* Assistant Professor HILLER

103. Development of Culture.—*Twice a week; first semester. One unit.*

107. Rural Communities.—*Twice a week; second semester. One unit.*
Dr. TYLOR

108. Research in the Social Effects of Poverty, and Their Prevention and Treatment.—*Twice a week; first semester. One unit.*

109. Research in Criminology.—*Twice a week; second semester. One unit.*
Professor TAFT

112. The Sociology of Conflict.—*Twice a week; second semester. One unit.*
Professor TAFT

126. Educational Sociology.—*Twice a week; second semester. One unit.* (Not given 1929-30.)

128. Disorganization and Fusion of Culture Resulting From Immigration.—*Twice a week; second semester. One unit.* Assistant Professor HILLER

150. Seminar.—Preparation of theses. One to two units.
Members of the Department

Courses for Graduates and Advanced Undergraduates

I. General Courses

3. Social Evolution.—*Three times a week; first or second semester.*

4. Social Control.—*Twice a week; first or second semester.* Mr. WATSON

6. Urban Sociology.—*Three times a week; first semester.* Dr. TYLOR

7. Rural Sociology.—*Three times a week; second semester.* Dr. TYLOR

II. Specialized Courses

8. Charities.—*Three times a week; first or second semester.* Mr. KROUT

9. Criminology.—*Three times a week; first or second semester.*
Professor TAFT

10. Problems of Population.—*Three times a week; second semester.*
Assistant Professor HILLER

17. Methods of Sociological Research.—*Three times a week; second semester.*

24. Penology.—*Three times a week; second semester.* Professor TAFT

27. Community Organization.—*Twice a week; second semester.*
Mr. KROUT

28. Immigration and Assimilation.—*Three times a week; first semester.*
Assistant Professor HILLER

TRANSPORTATION

Transportation may be taken as a major or minor for the master's degree and as a minor for the doctorate. No student will be admitted to graduate work in transportation unless he has a satisfactory acquaintance with the principles of economics and in addition such knowledge of the general problems of transportation as is represented by the content of the undergraduate course on the transportation system of the United States.

Course for Graduates

100. Railroad Problems.—*Once a week; both semesters. One unit.*
Dr. LOCKLIN

Courses for Graduates and Advanced Undergraduates

7. Railroad Finance.—*Three times a week; first semester.* Dr. LOCKLIN

8. Railroad Organization.—*Twice a week; first semester.* Mr. ORLAND

10. Railroad Rates.—*Three times a week; second semester.* Dr. LOCKLIN

16. Railroad Operation.—*Three times a week; second semester.* Mr. ORLAND

22. Ocean Shipping.—*Three times a week; first semester.* Professor LITMAN

26. Railroad Problems.—*Three times a week; second semester.*
Dr. LOCKLIN

ZOOLOGY

At least sixteen semester hours of college work in zoology are required for entering on major graduate study in this subject. Under special circumstances advanced work in closely allied subjects may be accepted in lieu of the fourth semester's work in zoology. When zoology is chosen for a minor the courses listed for graduates and undergraduates must be preceded by at least one full year's undergraduate work in zoology.

For the prosecution of graduate study in zoology a reading knowledge of German and French is indispensable and familiarity with Latin and Greek is of great advantage.

Graduate students specializing in zoology are strongly advised to spend at least one summer in study at the seashore. Every candidate for the doctor's degree will be required to furnish evidence of having completed satisfactorily at least one eight-week period in such work at an approved location. To facilitate this plan an investigator's room has been provided at the Woods Hole Marine Biological Laboratory, where members of the department are offered research facilities without cost to themselves. Application for the use of this room should be made to the head of the department early in the year. Similar facilities are sometimes afforded at other marine laboratories.

Students interested in the field of Genetics are referred especially to courses 115 and 124.

Courses for Graduates

102. Evolution of the Vertebrates.—*Twice a week; first semester. One-half unit.* (Given in 1929-30 and in alternate years). Assistant Professor ADAMS

103. Cytology.—*Twice a week; second semester. One unit.* (Given in 1929-30 and alternate years). Associate Professor SHUMWAY

106. Topics in Vertebrate Embryology.—*Twice a week; second semester. One unit.* (Given in 1930-31 and alternate years). Associate Professor SHUMWAY

107. Parasitology.—*Once or twice a week; both semesters. One unit.* (Given in 1930-31 and in alternate years.) Professor WARD

109. Physiological Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1930-31 and in alternate years). Professor SHELFORD

110. Economic Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1929-30 and in alternate years). Professor SHELFORD

111. Experimental and Field Ecology.—*Both semesters. One-half to two units.* Professor SHELFORD

115. Factors of Individual and Racial Development.—*Twice a week; both semesters. One unit.* Professor ZELENY

117. Faunistic Zoology.—Taxonomy and distribution, with especial reference to the local fauna. *Three times a week; first semester. One unit. Second semester. One-half to one unit.* Associate Professor VANCLEAVE

127. Theories of Animal Phylogeny.—Relations of various groups of animals; signification of so-called intermediate forms; invertebrate larval forms and theories of descent based on them. *Once or twice a week; both semesters. One unit.* (Given in 1929-30 and in alternate years). Professor WARD

Individual Research Courses

121. Invertebrate Morphology and Parasitology.—*One to two units.* Professor WARD

122. Vertebrate Morphology.—*One to two units.* Assistant Professor ADAMS

123. Faunistic and Systematic Zoology.—*One to two units.* Associate Professor VANCLEAVE

124. Experimental Zoology and Genetics.—*One to two units.* Professor ZELENY

125. Animal Ecology and Behavior.—*One to two units.* Professor SHELFORD

126. Embryology and Cytology.—*One to two units.* Associate Professor SHUMWAY

Courses for Graduates and Advanced Undergraduates

11. Experimental Ecology and Geography.—*Three or five times a week; first semester.* Professor SHELFORD

17. Field Zoology.—*Three times a week; first semester.* Associate Professor VANCLEAVE

19. Advanced Ornithology.—*Twice a week; first or second semester.* Dr. CAHN

20a-20b. Current Investigations.—Must be taken by all graduate students majoring in Zoology. *Once a week; both semesters.* Members of the department

21a-21b. Introduction to Zoological Research.—*Two to five times a week; both semesters.* Professor WARD

22-23. Morphology of Vertebrates.—*Two to four times a week; both semesters.* Assistant Professor ADAMS

63-66. Comparative Vertebrate Embryology.—*Two or four times a week; both semesters.* Associate Professor SHUMWAY

INDEX

Accountancy, 22
Admission, 9
Agronomy, 23
Amount of work for master's degree, 12
Animal Husbandry, 24
Architecture, 26
Astronomy, 26

Bacteriology, 27
Biological laboratories, marine, 12
Board of Trustees, 2
Botany, 28
Business Law, 30
Business Organization and Operation, 30

Calendar, 5, 6
Ceramic Engineering, 31
Changes in study-lists, 10
Character of graduate work, 9
Character of masters' degrees, 12
Chemistry, 33-38
Civil Engineering, 38
Classics, 40
Contents, Table of, 3, 4
Credit, transfer of graduate, 12

Dairy Husbandry, 41
Degrees, application for, 13
  Doctor's, 15
  in August, 13
  Masters', 13
  Professional, in Engineering, 14
Deposit, for laboratory material, 21
  for printing thesis, 17
Diploma fee, 20
Doctor's degree, 15
  examination for, 16, 17
  in engineering, 17
  period of study, 16
  residence, 15
  work in other universities, 16
  special regulations, see name of department as Classics, History, etc.

Economics, 42
Education, 46
Electrical Engineering, 48
Engineering, doctor's degree in, 17
  Master's degree in, 14, 15
  Professional degree in, 14
  Architectural, 26
  Ceramic, 31
  Civil, 38
  Electrical, 48
  Mechanical, 66
  Mining, 67
  Railway, 76
English Language and Literature, 49
Entomology, 52
Examinations for doctor's degree, 16, 17
Executive Faculty, 7
Expenses, 20
  board, 21
  room, 21

Faculty, Executive, 7
Failures, 11
Farm Organization and Management, 53
Fees, 20
Fellowships, 18

Final examination for doctor's degree, 16
Foreign language for master's degree, 13
French, 77

Genetics, 54
Geography, 56
Geology, 55
Germanic Languages and Literature, 56
Grades, 14
Graduate Club, 21
Greek, 40, 57

History, 57
  of Graduate School, 9
Home Economics, 61
Horticulture, 62

Incidental fee, 20
Italian, 78

Laboratories, marine biological, 12
Language and Literature, English, 49
  Germanic, 56
  Romance, 76
Language examination for doctor's degree, 16
  foreign, for master's, 13
Latin, 40
Libraries, 19
Library Science, 63
Listeners' courses, 10

Majors, 13, 15
Marine biological laboratories, 12
Master of Arts, degree of, 12
  See also special requirements of various departments, as Economics, Chemistry, etc.
Master of Science, degree of, 12
Master's degree in Engineering, 14
Mathematics, 64
Matriculation fee, 20
Mechanical Engineering, 66
Mechanics, Theoretical and Applied, 66
Medical Science, summer work in, 11
Meteorology, 67
Mineralogy, 68
Mining Engineering, 68
Minors, 12, 15
Miscellaneous courses, 10

Organization of Graduate School, 9

Philology, Romance, 79
Philosophy, 69
Physics, 69
Physiology, 72
Political Science, 72
Preliminary examinations for doctor's degree, 16
Professional degrees in Engineering, 14
Program of Study, 9
Psychology, 74
Public Speaking, 52

Railway Engineering, 76
Registration, 9
Residence study, 11, 15
Rhetoric, 52
Romance Languages and Literature, 76

Scandinavian Languages, 52
Scholarships, 18
Senior and graduate study, 10
Sociology, 79
Spanish, 78
Staff, students on, 11
Summer study, 11

Theoretical and Applied Mechanics, 66
Thesis, Doctor's, 17
  Master's, 13
  printing doctor's, 17
Thesis work on leave of absence, 14
Transfer of graduate credit, 12
Transportation, 81
Trustees, Board of, 2
Tuition, 20

Undergraduate courses open to graduate students, 10

Visitors, 10

Withdrawal, 11
Work done elsewhere, 11, 12, 16

Zoology, 81

THE GRADUATE SCHOOL

OF THE

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Announcements for

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GEORGE A. BARR, Joliet.....1931
WALTER T. FISHER, 134 S. La Salle St., Chicago.....1931
FRANK H. SIMPSON, Flora.....1931
LAURA B. EVANS, Taylorville.....1933
HELEN M. GRIGSBY, Pittsfield.....1933
WILLIAM L. NOBLE, 31 N. State St., Chicago.....1933
MARY E. BUSEY,* Urbana.....1935
JAMES W. ARMSTRONG, 1822 30th St., Rock Island.....1935
MERLE J. TREES, 37 W. Van Buren St., Chicago.....1935

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*Deceased, April 7, 1930.

CONTENTS

PAGE

Board of Trustees 2
University Calendar 5, 6
Executive Faculty 7
History and Organization 9
Admission 9
Character of Graduate Work 9
Registration 9
  Residence 11
Masters' Degrees 12
  In Arts and Science 12
  In Engineering 14
The Doctor's Degree 15
  Period of Study 16
  Examinations 16
  Thesis 17
  In Engineering 17
Scholarships and Fellowships 18
Libraries 19
Fees and Expenses 20
Graduate Club 21

Departments of Instruction

Accountancy 22
Agronomy 23
Animal Husbandry 24
Architecture and Architectural Engineering 26
Astronomy 26
Bacteriology 27
Botany 28
Business Law 30
Business Organization and Operation 30
Ceramic Engineering 31
Chemistry 32
Civil Engineering 38
Classics 39
  Greek 39
  Latin 40
Dairy Husbandry 40
Economics 42
Education 45
Electrical Engineering 47
English 48
  Language and Literature 49
  Rhetoric 51
  Public Speaking 51
  The Scandinavian Languages 51

PAGE
Entomology ... 52
Farm Organization and Management ... 52
Genetics (See Zoology) ... 53
Geology ... 53
Germanic Languages and Literature ... 55
Greek (See Classics) ... 56
History ... 56
Home Economics ... 60
Horticulture ... 61
Library Science ... 62
Mathematics ... 63
Mechanical Engineering ... 66
Mechanics, Theoretical and Applied ... 66
Meteorology (See Geology) ... 67
Mineralogy (See Geology) ... 67
Mining Engineering ... 67
Philosophy ... 68
Physics ... 69
Physiology ... 72
Political Science ... 72
Psychology ... 74
Railway Engineering ... 75
Romance Languages and Literatures ... 76
  French ... 76
  Italian ... 77
  Spanish ... 78
Sociology ... 78
Transportation ... 80
Zoology ... 81
Index ... 83

GRADUATE SCHOOL CALENDAR

SUMMER SESSION

1930	
June 16, Mon.	Registration Day
June 17, Tues.	Instruction begins
July 4, Fri.	A legal holiday
July 26, Sat., 12 m.	Last day for candidates for degrees in August to deposit theses
Aug. 8, 9, Fri., Sat.	Final examinations

FIRST SEMESTER

1930	
Sept. 19, 20, Fri., Sat.	Registration Days
Sept. 22, Mon.	Last day for candidates for the degree of A.M. and M.S. in October to file applications for degrees and to deposit theses
Sept. 24, Wed., 8 a.m.	Instruction begins
Sept. 26, Fri.	Preliminary examination in French
Oct. 3, Fri.	Preliminary examination in German
Nov. 3, Mon.	Last day for candidates for professional engineering degrees to file statements of professional study and experience
Nov. 26, Wed., 11 a.m.	Thanksgiving recess begins
Dec. 1, Mon., 1 p.m.	Instruction resumed
Dec. 22, Mon., 11 a.m.	Holiday recess begins
Dec. 31, Wed., 5 p.m.	Last day for candidates for professional engineering degrees to submit outlines of theses
1931	
Jan. 5, Mon., 1 p.m.	Holiday recess ends
Jan. 17, Sat., 12 m.	Last day for filing applications for Masters' degrees to be conferred in February
Jan. 17, Sat., 12 m.	Last day for candidates for the degrees of A.M., M.S. and Ph.D. in February to deposit theses
Jan. 24, Sat.	Preliminary examination in French
Jan. 27, Tues.	Semester examinations begin
Feb. 4, Wed.	Semester examinations end
Feb. 7, Sat.	Preliminary examination in German

SECOND SEMESTER

Feb. 6, 7, Fri., Sat.	Registration days
Feb. 11, Wed., 8 a.m.	Instruction begins
Mar. 2, Mon.	Last day for applications for Scholarships and Fellowships for 1931-1932
Apr. 2, Thurs., 11 a.m.	Easter recess begins
Apr. 7, Tues., 1 p.m.	Easter recess ends
Apr. 24, Fri.	Preliminary examination in French
May 1, Fri.	Last day for candidates for professional engineering degrees to deposit completed theses
May 1, Fri.	Last day for filing applications for Masters' degrees to be conferred in June
May 1, Fri.	Preliminary examination in German
May 15, Fri.	Last day for filing applications for Masters' degrees to be conferred in August
May 20, Wed.	Last day for candidates for the degree of Ph.D. in June to deposit theses
June 2, Tues.	Semester examinations begin
June 3, Wed.	Last day for candidates for the degree of A.M. and M.S. in June to deposit theses
June 10, Wed.	Semester examinations end
June 17, Wed.	Sixtieth Annual Commencement

THE EXECUTIVE FACULTY

DAVID KINLEY, PH.D., LL.D., PRESIDENT OF THE UNIVERSITY

ARTHUR HILL DANIELS, PH.D., *Professor of Philosophy and Dean of Graduate School*

ROGER ADAMS, PH.D., *Professor of Organic Chemistry*

WILLIAM LEONIDAS BURLISON, PH.D., *Professor of Crop Production*

EDWARD HERBERT CAMERON, PH.D., *Professor of Educational Psychology*

ARTHUR BYRON COBLE, PH.D., *Professor of Mathematics*

MAXWELL JAY DORSEY, PH.D., *Professor of Pomology*

HERBERT FISHER MOORE, M.M.E., D.SC., *Research Professor of Engineering Materials*

REXFORD NEWCOMB, A.M., M.ARCH., A.I.A., *Professor of the History of Architecture*

WILLIAM ABBOTT OLDFATHER, PH.D., *Professor of Classics*

WILLIAM SPENCE ROBERTSON, PH.D., *Professor of History*

HENRY PERLY RUSK, M.S., *Professor of Cattle Husbandry*

FRED WILBUR TANNER, PH.D., *Professor of Bacteriology*

ARTHUR CUTTS WILLARD, B.S., *Professor of Heating and Ventilation*

HISTORY AND ORGANIZATION

The University of Illinois offered facilities for advanced study and research in various lines as early as 1872. Organized graduate instruction, however, under the name of the Graduate School, was first undertaken in 1892. In 1894 the administration of the school was vested in the Council of Administration, and the Vice-President of the University became Dean of the School. In 1906 the Graduate School was organized as a separate faculty, consisting of a dean and members of the University faculty assigned to this duty by the President.

By action of the Trustees the teaching faculty of the Graduate School includes all members of the University faculty who give instruction in approved graduate courses. The affairs of the School, however, are in charge of the Executive Faculty appointed each year by the President.

ADMISSION

Admission to the Graduate School may be granted to graduates of institutions whose requirements for the bachelor's degree are substantially equivalent to those of the University of Illinois, and to applicants from other institutions approved by the Executive Faculty, as hereinafter provided. *Admission to the Graduate School does not, however, imply admission to candidacy for an advanced degree, and gives no right or claim to be so admitted. Such candidacy is determined by the faculty after the student has demonstrated by his work here, for from two to five months, that he has the ability to do major work of graduate character. A mere accumulation of "credits" or "grades" is not sufficient.*

Admission to graduate courses may be granted only to those who have had the requisite undergraduate work in those courses or departments. But a student of mature age who satisfies the Dean and the Department concerned of his ability to pursue graduate work in a given line may be enrolled in particular graduate courses, without reference to a degree, and permitted to carry on such study or investigation under the direction of a department of the University as the department shall recommend and the Dean approve.

Application blanks for admission may be secured from the Registrar of the University. Every applicant must submit with his application for admission an official transcript of his college record.

CHARACTER OF GRADUATE WORK

The principal aim of graduate study is the development of the power of independent work and the promotion of the spirit of research. Each candidate for a degree is expected to have a wide knowledge of his subject and of related fields of work; for the graduate student is not expected to get from lecture and laboratory courses all the knowledge and training necessary to meet the requirements for his degree.

REGISTRATION AND PROGRAM OF STUDY

The following regulations concerning registration and program of studies are laid out primarily for first-year students. Second-year and third-year graduate

students fill out their programs irrespective of the unit value of courses, according to their needs, under the advice of their instructors.

Registration.—Each graduate student must register at the beginning of each semester. The registration of a new student may be accepted at any time provided the student is prepared to take up courses actually under way. Credit towards the fulfillment of the residence requirement dates, however, from the time of registration and not from the beginning of the semester or year in which the student enters. Registration will not be permitted later in the year than April 1, except in the case of students who expect to continue through the summer session, or are returning to complete a year's work which has been interrupted by unavoidable circumstances. *No student is permitted to attend any University course in which he is not registered.*

A new student must fill out in duplicate an application for admission and submit it to the Registrar, from whom, after the approval of his application, he will receive a card of admission and a study-list which will give details of procedure in registering. He should fill out the study-list after consultation with his adviser, or the person in charge of his major work, and also with the instructors whose courses he wishes to elect. *Registration, including the payment of fees, must be completed by the close of the registration days of the Graduate School. Otherwise a fee of $5.00 for late registration will be charged all former students.*

Changes in Study-Lists.—A graduate student is expected to plan his work so carefully that changes in his study-list during the semester will not be necessary. When a change seems advisable, however, it may be permitted without fee if made within three weeks of the date of registration. After that date a fee of one dollar is charged for each change, except that the total charge for rearrangement authorized on any one change slip shall not exceed two dollars.

Advanced Undergraduate Courses Open to Graduate Students.—

1. *Courses not open to students below senior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as unit courses for graduate credit, or as half-unit courses when listed for less than four hours of undergraduate credit.

2. *Courses open to students of junior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as half-unit courses for graduate credit, or as quarter-unit courses when listed for two to three hours undergraduate credit. Courses to which sophomores are regularly admitted may not be taken for graduate credit, either major or minor.

Seniors and Graduate Study.—If at the beginning of the second semester of his senior year a student who has been in residence at least one year is within five hours of a bachelor's degree, he may be permitted to register for courses which may count for residence for a master's degree, provided his program does not require more than twelve formal class, lecture, or laboratory exercises a week, and is approved by the Dean at the time of registration. Only students of excellent record will be allowed this privilege.

Miscellaneous and Listeners' Courses.—Graduate students are permitted under proper circumstances to attend classes as listeners, and to elect miscel-

laneous subjects, that is, courses which do not count toward an advanced degree. Listeners' cards may be obtained at the Dean's office. A graduate student in full standing and carrying a minimum program, may be permitted, under proper circumstances, to attend one class as a listener, or to elect one miscellaneous subject (that is, a course which does not count towards an advanced degree). No subject is open as a listener's or miscellaneous course unless it has a specific educational bearing on the student's major or minor subjects of study.

A student who elects a miscellaneous course is required to register in it, do the work, and pass the semester examinations, unless he is permitted to withdraw under the rules. A student who has a listener's card is not permitted to participate in the class work or the examination.

No student may register for a full minimum program of work for graduate credit if it is necessary for him to carry at the same time more than one miscellaneous subject and to visit one course.

Students on the Staff.—Assistants and others on the University staff who undertake to do graduate work are permitted to take an amount of work determined by the terms of their employment. Such a student, if required by his engagements to teach more than five classes a week or to have laboratory work or supervision exceeding ten hours a week, may not receive his master's degree at the end of one year, nor his doctor's degree at the end of three.

Residence and Work Done Elsewhere.—Continuous residence and study are required of all members of the Graduate School, unless they are granted leave of absence by the Dean, upon recommendation of the professor in charge of their work, for the purpose of carrying on elsewhere studies or investigation in the line of work for their degrees.

Graduate Study in the Summer.—Graduate students in the Summer Session are subject to the same scholastic requirements as those in the regular University year. Their study-lists must be approved by the Dean of the Graduate School, or his representative. Attendance during four out of six consecutive summer sessions, or one semester and two summer sessions, is considered the equivalent of one year in residence. The faculty is unwilling to accept summer-session work beyond the master's degree towards the doctor's degree, except in the case of a student who works in a summer session preceding or following a regular year's attendance at the University. In no case may the last year's work for the doctorate be done in disconnected summer sessions.

No course offered in the Summer Session may be taken for credit towards a higher degree unless it is described in the summer-session circular as accepted for that purpose.

Summer Work in Medical Sciences.—Graduate courses in medical sciences are offered in the summer quarter between June and September at the College of Medicine of the University of Illinois in Chicago. Circulars describing the courses offered and conditions of admission and work may be obtained from the Secretary of the College of Medicine, Congress and Honore Streets, Chicago.

Failures.—A graduate student who fails in any course in his major subject cannot secure his degree in the same year in which the failure occurred. No condition examinations are given graduate students.

Withdrawal.—If after registration a graduate student wishes to withdraw from any course or to add other work, he must first secure the necessary papers

from the Dean's office. See the regulations concerning changes in study-lists, page 10. If he wishes to withdraw from the University he must get clearance papers at the Dean's office.

DEGREES

Masters' Degrees

Character of Masters' Degrees.—The master's degree conferred depends upon the character of the bachelor's degree. The usual practice is that A.M. shall follow A.B., and that M.S. shall follow B.S. However, this practice may be departed from in cases where the undergraduate course of study of the candidate was of a kind for which some reputable institutions in this country give A.B., while others give B.S.

Amount of Work Required.—Candidates for the degree of Master of Arts or Master of Science are required to do at least one full year's work in residence, including a thesis. By this is meant from four to five unit courses each semester or their equivalent. A unit course is one which requires ten hours of time a week through one semester, or a minimum of 180 hours, irrespective of the mode of distribution of that time in class work, laboratory work, and private study. Four such courses or their equivalent constitute a full *minimum* program for one semester, and eight such courses, or their equivalent, constitute the *minimum formal* year's work accepted for a master's degree. Only first rate students are permitted to secure a degree with this minimum program.

Unless otherwise permitted, every student must take each semester at least one course open to graduate students only (courses numbered 100 and upwards).

In the first year of his graduate study each student is required to attend a minimum of four formal class, lecture, or laboratory exercises a week. In no case is he permitted during his course to attend more than twelve a week, without permission.

Work Done Elsewhere.—Members of the staff and high-school teachers residing and employed in Urbana or Champaign who have done graduate work in approved institutions elsewhere may secure credit not to exceed four units towards the master's degree by passing examinations in that work. They may complete the work for the degree by securing at least four units more while registered in the Graduate School for not less than one academic year.

Students in zoology who take work in a marine or fresh-water biological laboratory or station are permitted to offer not less than six weeks nor more than nine weeks of such work in partial fulfillment of the requirement for the master's degree.[1] This privilege is granted only when the work is done with the permission of the faculty (secured in advance), in an approved laboratory, and under instructors accepted by the faculty. Credit for such work may be secured by examination after the student has submitted an official certificate of attendance at the laboratory or station, together with a full written report of the work done there. No candidate for the master's degree may avail himself of this provision who is not registered in the Graduate School for one full academic year, during which he shall do the rest of the work necessary for his degree.

Similar arrangements are made, under similar conditions, for students of geology in connection with Geological Surveys.

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[1]The experience at a marine laboratory which, as indicated above, is optional with the candidate for the master's degree, is required of all candidates for the doctorate in zoology.

Majors and Minors.—A candidate for a master's degree may do all his work in one subject, or he may select a major and one minor, or a major and two minors. A major or minor denotes the field of knowledge of a department, or such part thereof as constitutes a separate and independent division of that field. For a master's degree a major is at least half the work, or a minimum of four units, for one year. Less than one unit may not be counted as satisfying the requirements of a minor without the approval of the department concerned.

Foreign Language.—The ability to use one or more of the modern languages ordinarily studied in the undergraduate curriculum is expected of all candidates for the master's degree, and in some lines of study is required. On this matter students should consult the heads of the departments in which their major subjects lie.

Masters' Theses.—Each candidate for a master's degree is required to present a thesis on some subject approved by the professor in charge of his major work. Such approval, except in case of students working for masters' degrees in summer sessions only, must be secured and the subject of the thesis filed at the office of the Graduate School not later than the beginning of the second half year of residence.

Students working for masters' degrees exclusively in summer sessions must announce their thesis subjects not later than the beginning of their third session in residence. The requirement of a thesis may be waived, however, on the recommendation of the professor in charge of his major work and the approval of the Dean, *provided application to waive the thesis is made at the time for announcing thesis subjects.* A student excused from writing a thesis must replace it with additional courses of instruction.

No one will be excused from writing a thesis unless one-half of his program of studies consists of courses numbered 100 and upwards.

The thesis required from a candidate for a master's degree ordinarily will demand one-fourth of the student's time and may not exceed one-third of it. The thesis must be typewritten, on "thesis paper,"[1] and the title page must be printed. The thesis in its final form, together with a certificate of approval by the proper officer, must be left by the professor in charge at the Dean's office at least two weeks before the date on which the degree is to be conferred. No article prepared for another use, or previously published, will be accepted as a thesis.

Applications for Degrees.—Each candidate for the degree of Master of Arts or Master of Science shall file an application for the degree on a blank provided for the purpose, to be had at the Dean's office. For the dates of applications and of deposition of theses, consult the calendar at the beginning of the bulletin.

Degrees in August.—Students who expect to become candidates for the master's degree in August may be recommended at the June meeting of the Senate subject to the successful completion of the work for which they are to register in the Summer Session. However, in order to avail themselves of this privilege, students must file with the Dean before the June meeting of the Senate an exact statement of the work necessary to complete the requirements for the degree. Blanks for this purpose may be secured at the Dean's office.

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[1]No other will be accepted by the Dean. "Instructions for the Preparation of Theses" may be obtained at the Dean's office.

Thesis Work on Leave of Absence.—Under proper conditions a student may be permitted to complete the last fourth of his work, if devoted to his thesis, under leave of absence for a period not to exceed the equivalent of two semesters. To get such permission the student must have secured credit for at least six units; must petition for the privilege; must submit to the Dean an outline of the proposed investigation, approved by the professor in charge of his major work, and must submit satisfactory evidence that adequate facilities are available to him at the place where he intends to do the proposed work. Approval on all these points must be obtained one collegiate year before the thesis is due. Immediately following approval the student must register and pay an incidental fee of $20.00.

Grades.—Students' work is graded in five classes, A, B, C, D, and E. The last indicates a failure. D indicates unsatisfactory, though passable work.

A student who receives two units of a grade below B during his first year of graduate work may not complete the first year of residence by carrying the minimum program of eight units for the master's degree. Three units of a grade below B disqualify a student as a candidate for a degree.

A failure or absence from examination in any course or failure in any other examination prescribed by the department of the major may prevent the conferring of the degree; and, as already indicated, failure in any course in the major field precludes the conferring of the degree in the same year.

Second Degrees in Engineering

Two classes of second degrees are open to graduates of the College of Engineering, namely, academic and professional.

The academic second degree in engineering is Master of Science, following Bachelor of Science, in architecture, architectural engineering, civil engineering, electrical engineering, etc. This degree is conferred in accordance with the regulations described above for *academic work in residence only.*

The *professional* second degrees in engineering are as follows:

Master of Architecture, after B.S. in architecture.

Architectural Engineer, after B.S. in architectural engineering.

Ceramic Engineer, after B.S. in ceramic engineering.

Civil Engineer, after B.S. in civil engineering or in railway civil engineering.

Electrical Engineer, after B.S. in electrical engineering or in railway electrical engineering.

Mechanical Engineer, after B.S. in mechanical engineering or in railway mechanical engineering.

Engineer of Mines, after B.S. in mining engineering.

Engineer—Physicist, after B.S. in engineering physics.

Professional degrees in engineering may be conferred on two classes of candidates: (1) those who have received an academic degree in engineering from the University of Illinois; (2) those who have received an academic degree in engineering from other institutions of equal standing and who have been members of the teaching or research staff of the College of Engineering or Engineering Experiment Station of the University of Illinois for at least three years prior to the conferring of the professional degree.

A candidate declares his candidacy by filing with the Dean of the College of Engineering, as chairman of the committee in charge, a detailed statement covering his professional engineering experience. This statement must be made

upon a standard form supplied by the Dean of the College of Engineering, as chairman of the committee in charge, and must be filed not later than the first Monday in November preceding the commencement at which the candidate expects to receive the degree. No statement of experience will be considered by the committee which does not show that the candidate has had a minimum of four years of acceptable engineering experience after receiving the degree of Bachelor of Science, and that for at least three years he has been in responsible charge of engineering work. Responsible charge in engineering teaching may be considered as responsible charge of work. In determining the acceptability of the engineering experience of the candidate the committee will be guided by the character of his professional work and the degree of responsibility involved, and will take into consideration such evidences of professional ability and growth as may be shown by his investigation of engineering problems, his contributions to technical literature and his membership and activity in engineering societies.

If the professional experience of the candidate is accepted he must submit for approval, prior to December 31, an outline of his proposed thesis. The completed thesis, in the form prescribed in the "Instructions for the Preparation of Masters' and Doctors' Theses," must be deposited with the Dean of the College of Engineering not later than May 1. The candidate must present himself at commencement in order to receive the degree.

A candidate for a professional engineering degree must pay the incidental fee of fifty dollars on being notified that his professional experience is accepted as qualifying him to enter as a candidate for the degree. No one will be enrolled as a candidate for the degree at the following commencement who does not pay his fee at this time. When a candidate for a professional engineering degree has once been accepted and paid his fee, he is eligible to receive the degree at any time within five years, without additional fee, on completion of the requirements; provided, however, that unless he completes the requirements within two years his name will be dropped from the list of candidates and in order to receive the degree within the five-year period he must register once more.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Major and Minor Subjects.—A member of the Graduate School who desires to become a candidate for the degree of Doctor of Philosophy is required to pursue a major subject in the department in which his research lies. He is also required to choose one minor subject, or he may choose two. If one minor only is chosen it must be taken in a department of study other than that of the major, and credit for it may be earned by work representing not less than four units, or one-sixth of the total residence required for the doctorate. If two minors are chosen, one must be a subject closely related to the major. With the approval of the adviser it may be a division of the major field of study. If the second minor is outside the department of major study, it may be satisfied by work representing not less than two units or one-fourth of a year of residence.

Except by special permission of the Dean the preliminary examination in major and minor subjects may not be taken until the minor work has been done.

Method of Computing Residence.—Credit for a full year of graduate work means that the student has during that time devoted all his working time and

energy to study of a graduate grade. After the first year of residence credit is not recorded in units, and there is no fixed correspondence between credit and courses as in undergraduate work. Thus it is possible for a second-year student to devote all his time to one course and his research; and for a third-year student to devote all his time to his research alone.

Period of Study.—The *minimum* period of study required for securing the degree of Doctor of Philosophy is three years, during which the student is required to devote all his working time to his studies. All three years must be spent in resident graduate study at some accredited educational institution and either the first two or the last one of the three must be spent at the University of Illinois. The degree is conferred, however, not for residence during a certain period, but for scholarly attainments and power of investigation, as proved by a thesis and examinations.

Work Done in Other Universities.—Credit for graduate work done in other universities is not "transferred." However, it may be accepted on examination as equivalent to resident work at the University of Illinois, provided the institution in which it was done is of high standing.

Examinations

Preliminary.—A. In major and minors.—Towards the end of his second year of study, or by special permission, at the beginning of his third year (not later than the first Saturday in October), the candidate for the degree must submit to a preliminary examination, in order to determine whether he will be accepted as a candidate for the degree in the following year. This examination is intended to test the student's knowledge of the fields of his major and minor subjects of study only. It is partly oral, and may be wholly so.

The student will not be admitted to his preliminary examination until the faculty is satisfied that he has finished substantially the equivalent of two years' graduate work. He must do a full year's graduate work between his preliminary examination and the completion of his work for the doctorate.

B. In Languages.—The candidate will be required to demonstrate his ability to read French and German and other languages needed in his work. This test of proficiency in the use of French and German must be passed before the student is admitted to the preliminary examination in major and minor subjects. For the dates of these language examinations consult the calendar at the beginning of this bulletin.

Application for admission to these examinations must be made a week, at least, in advance of the date of the examination.

Final Examination.—At least two weeks before the time when the degree is conferred, the candidate must submit to a final examination, given by a committee appointed by the Dean. This examination is primarily on the research work of the student, as embodied in his thesis, but it is not confined to that. It extends to the whole field of study of the candidate. It will not be confined to the courses which the candidate has attended in the University of Illinois only, if he has done part of the work elsewhere; nor even to the field covered by the courses specifically taken in this or other universities; but will be so conducted as to determine whether the candidate has a satisfactory grasp of his major subject as a whole, and a general acquaintance with the fields of knowledge represented by his course of study.

The final examination may not be divided. The examination must be taken all at one time even tho it requires several sessions.

If after having passed his preliminary examination, he fails in the third year of his study to meet the expectations of the professors in charge of his work, or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

Other Examinations.—Before the candidate is admitted to the final examination and the defense of his thesis, he may be required to take any other examination, oral or written, that is thought proper by the various departments in which he has studied.

The above examinations are in addition to those in the courses for which the student is registered. These must be taken at the time for which they are set in the examination schedule.

Thesis.—The power of independent research must be shown by the production of a thesis on some topic connected with the major subject of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or as many of them as may wish to question him about it, in connection with his final examination.

The subject of the thesis should be chosen not later than the end of the second year of residence and must be submitted for formal approval by the faculty not later than six weeks from the beginning of his third year of residence.

A typewritten copy of the complete thesis, *on thesis paper,*[1] and in final form must be deposited in the office of the Dean for presentation to the examining committee not later than two weeks prior to the final examination and not less than four weeks before the time when the degree is conferred. At the same time, the candidate must deposit with the Dean a manuscript of the essential part, or an abstract, or a digest of his thesis, in condition for publication at a cost not to exceed seventy-five dollars ($75). The manuscript must be sufficient to show the method followed, the evidence used and the conclusions reached in the investigation, and must bear the approval of the department and the Executive Faculty of the Graduate School.

The candidate must pay to the Comptroller before graduation the sum of seventy-five dollars ($75) out of which the University will print at least one hundred copies of this manuscript for circulation by the University, unless the thesis entire or in abbreviated form is published by the author or is accepted for publication by a standard journal or publisher within a year from the date of graduation. In the latter event, and after one hundred copies have been presented to the University by the writer, the cash deposit shall be returned to him.

The typewritten and printed forms of the thesis must comply with the regulations given in "instructions for the preparation of masters' and doctors' theses," copies of which may be obtained at the Dean's office.

Doctor's Degree in Engineering.—The degree of Doctor of Philosophy in Engineering is offered in certain lines of academic work of a high scholastic type in engineering science for students who wish to prepare themselves as teachers, investigators, and experts.

The general requirements for this degree, as to preliminary education, linguistic attainments, etc., are the same as in other lines.

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[1]No other will be accepted by the Dean.

The following lines of engineering science, or others approved by the Graduate School, may be elected as majors:

Engineering mechanics
Steam engineering
Hydraulic and sanitary engineering
Electrical engineering
Heating and ventilation engineering
Railway engineering
Masonry construction and structural engineering
Coal-mining engineering
Ceramic engineering

The first minor may be any of the above or one of the following sciences or an authorized combination of two of them:

Theoretical mechanics
Mathematics
Thermodynamics
Bacteriology
Chemistry
Geology
Physics (Experimental or mathematical)
Zoology
Botany
Economics

The second minor should be in other than engineering subjects.

SCHOLARSHIPS AND FELLOWSHIPS

A number of scholarships and fellowships have been established by the Trustees of the University. To first-year graduate students of ability and promise, there are open a number of scholarships with a stipend of $300 each and freedom from tuition, incidental, and laboratory fees.[1] To second-year and third-year graduate students, that is, those who have had one or two years of graduate study, there are open fellowships with stipends of $400 and $500, with freedom from the above-mentioned fees. The larger stipend is given only to students who are expected to take their degrees within the year. Each holder of a fellowship or scholarship must pay the matriculation fee of ten dollars, unless he holds a first degree from the University of Illinois, and also the diploma fee of ten dollars on receiving his diploma.

Candidates for these scholarships and fellowships must be graduates of the University of Illinois, or of colleges or universities having equivalent requirements for bachelors' degrees.

Application must be made on blanks to be obtained from the Dean of the Graduate School. These application forms should be sent to the Dean of the Graduate School as early as possible in February of the academic year preceding that for which the fellowship is desired. No application will be considered if received later than March first, until after April fifteenth, the date when appointees from the first list of applications must accept or refuse their appointments.

Persons appointed are notified on April first and must send the Secretary of the Board of Trustees notice of their acceptance or refusal by April fifteenth;

[1]Up to a certain amount.

and must agree that, if accepted, the appointment will not be resigned to take a similar one in any other institution during the year for which it is awarded.

Nominations to fellowships are made on the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself. Scholarships and fellowships are not given to candidates who are over thirty years of age at the time when the appointment is to be made.

For second-year fellowships, adequate preparation in French or German, and for third-year fellowships, adequate preparation in both French and German is required.

An appointment as honorary fellow, without stipend, may be made as specified for paid fellowships in the case of any one who has shown distinguished merit in his work.

The Carr Fellowship in Chemistry.—The Honorable Robert F. Carr, of the class of 1893, gave in 1919 the sum of ten thousand dollars, the income of which is to be used as the stipendium of a fellowship in chemistry or chemical engineering. The stipend is $750.

Du Pont Fellowship in Chemistry.—DuPont de Nemours and Company gives the University each year the sum of $750 for a fellowship in chemistry.

LIBRARIES

The general University library, the library of the State Natural History Survey, and that of the State Geological Survey are all at the University in Urbana. The libraries of the School of Pharmacy and the College of Medicine are in Chicago.

These libraries contain about 800,330 volumes, and about 164,750 pamphlets. Of these 758,510 books and 156,950 pamphlets are in the libraries at Urbana; the rest are in Chicago. The library at Urbana also contains 2,930 maps and 8,260 pieces of sheet music. The departments at Urbana currently receive about 6,000 serials, while the College of Medicine and School of Pharmacy in Chicago receive 250.

The general library of the University is open daily, from 8 a. m. until 10 p. m. and on Sunday from 2:30 p. m. until 5:30 p. m.

A number of departmental and college libraries and reading rooms are maintained in the library and in other buildings on the campus; these libraries do not necessarily contain all the books in the respective subjects. In some instances they are primarily for the use of the graduate students and advanced undergraduate students in the departments using the respective buildings. The principal departmental libraries and reading rooms are the following:

Name of Library	*Location*	*Estimated number of volumes*
Philosophy, Psychology, and Education	Library Building	34,500
Classics	Library Building	23,600
Modern Languages	Library Building	6,000
English	Library Building	6,500
History and Political Science	Library Building	20,100
Economics, Sociology and Commerce reading Room	Library Building	3,500
Natural History	Natural History Hall	23,000
Law	Law Building	36,000
Architecture, Ricker Library of	Architecture Building	5,800
Agriculture Reading Room	New Agriculture Building	12,000
Chemistry	Chemistry Building	11,100
Physics	Physics Building	1,600
Mathematics	Mathematics Building	6,100
Engineering	Engineering Hall	9,800

The Dittenberger Classical Library.—The University possesses the library of Wilhelm Dittenberger, at one time Professor of Classical Philology in the University of Halle. This library contains 5,600 items. It includes the works of the poets and prose writers, numerous works on grammar and history of literature, and between four and five thousand dissertations and programs on special topics. There are also many works dealing with other departments of classical philology, as epigraphy, history of ancient peoples, archeology, philosophy, history of art, geography, chronology, metrics, etc.

The Heyne Library of Germanics.—The library of Professor Moritz Heyne of the University of Göttingen was bought by the University. It contains about 5,200 volumes. The collection is rich in the general field of German philology and in lexicography. It has many rare first editions of works of German literature from the sixteenth, seventeenth, and eighteenth centuries and has sets of a number of rare periodicals.

The Gröber Library in Romance Languages.—The University also possesses the library of Professor Gröber of the University of Strassburg. This library contains about 6,500 titles.

The Vahlen Library, of the late Johannes Vahlen, contains about 10,000 volumes and is in itself an excellent working library in classical philological literature. It is well supplied with texts of Greek and Latin authors.

The Aron Library, collected by the late teacher and student of pedagogy, R. Aron, contains about 20,000 volumes. It is a scholarly collection of educational documents, among them many original and early editions, and furnishes first-hand material for the study of educational movements in Europe, especially in Germany, from the time of Luther and Comenius to the present. The collection of German "Fibeln" or school readers is unique, and the material for the history of juvenile songs and literature, the set of 17th and 18th century atlases, and the collection of rare hymn books and juvenilia make the collection very useful to students of education.

The Cavagna Library.—The library of the late Count Antonio Cavagna Sanigiuliani di Gualdana has been bought by the University. It is estimated that the library contains about 40,000 volumes, besides many maps, manuscripts, and prints, making a notable collection for the study of Italian history, literature, and art.

FEES AND EXPENSES

Except as noted below, graduate students pay fees as follows:

Matriculation fee	$10.00
Incidental fee, each semester, for residents of Illinois	25.00
All students, not residents of Illinois, pay, each semester an incidental fee of	37.50
Incidental fee for students registered for thesis work towards the master's degree on leave of absence	20.00
Diploma fee	10.00
For late registration	5.00
For change in study-list	1.00

All graduate students who have not matriculated as undergraduates at the University of Illinois pay the matriculation fee on entrance.

All graduate students pay the diploma fee.

No tuition or incidental fee is charged for graduate courses to scholars, fellows, or members of the corps of instruction or the staffs of the University libraries or of the scientific bureaus or experiment stations, who are appointed by the Board of Trustees, nor for undergraduate courses on their study-lists if approved by the heads of the departments and by the Dean of the School as necessary or desirable for the proper completion of the work for the degree. Otherwise graduate students who take undergraduate courses must pay the proper undergraduate fee.

Each student working in the laboratories, or in the drafting or engineering classes, is required to pay a fee of from 50 cents to $15.00 in each course for chemicals and apparatus used, and for any breakage or damage. But no charges or deposits for laboratory materials are required from scholars, fellows, or members of the corps of instruction or scientific staffs mentioned above, except when breakage or consumption of materials exceeds a certain allowance.

Table board may be obtained at prices ranging from $7 a week.

Room rent, single room, ranges from $20 a month; double room, $12.50 a month, each person.

THE GRADUATE CLUB

The Graduate Club is an unofficial organization of the graduate students and faculty. Its purpose is to furnish an opportunity for those working in different departments to become acquainted with one another and thus counteract the tendency toward narrowness which intense specialization may sometimes induce.

DEPARTMENTS OF INSTRUCTION

Courses open to graduate students are of two classes. The first class is wholly of graduate grade, and the courses are numbered 100 upwards. The second class includes the courses classified as for graduates and advanced undergraduates. These carry numbers below 100. The courses numbered 100 and upwards are all accepted for major credit. Those of the other group are in many cases accepted for minor credit only. This is especially true of courses which are open to juniors.

All courses have certain prerequisites for admission. Inasmuch as the prerequisite preparation may be gained at other institutions from courses differing from those offering a similar preparation at the University of Illinois, so that a statement of prerequisites as given here would not be understood elsewhere, their description is omitted altogether. However, a student who wishes to enter a particular course must satisfy the department concerned that he has had in some form the prerequisites for admission to the course.

For the convenience of first-year students the credit value of graduate courses is given in units. These values have no significance for second-year and third-year students.

The credit received for "courses for graduates and advanced undergraduates" is in accordance with the regulations of the Graduate School (see page 10).

Students are admitted to graduate standing in agriculture who have had a thoro training in the sciences underlying agriculture, and who are otherwise eligible to the Graduate School, even tho their undergraduate course of study lacked to some extent the amount and kind of technical work in agriculture included in the course of study for the bachelor's degree in agriculture at the University of Illinois.

ACCOUNTANCY

A student may major in accountancy for the master's degree only. The courses may be taken for minor credit by applicants for the master's or doctor's degree in other departments with the approval of the adviser. The courses in accountancy for graduates only may be selected by those who have had approximately 15 university credits in accountancy, including Accountancy 3a or its equivalent. Accountancy 4a is a prerequisite for 104; 3b for 110; 13 for 113; and 20 for 120.

The courses for graduates and advanced undergraduates may be taken by those who have had the equivalent of 12 university credits in accountancy.

Courses for Graduates

103. **Advanced Theory and History.**—*Twice a week; both semesters. One unit.*
Associate Professor LITTLETON

104. **Accounting Systems.**—*Twice a week; both semesters. One unit.*
Professor SCOVILL

113. **Governmental Accounting.**—*Twice a week; second semester. One unit.*
Professor MOREY

120. Income Tax Development.—*Twice a week; first semester. One unit.*
Professor FILBEY

129. Thesis.—*Once a week; both semesters. One unit.*
Professor FILBEY and members of the staff

Courses for Graduates and Advanced Undergraduates

3a. Advanced Accounting.—*Three times a week; either semester.*
Professor FILBEY, Associate Professor LITTLETON

3b. Auditing.—*Three times a week; either semester.*
Professors FILBEY, SCOVILL, Associate Professor LITTLETON

4a. Cost Accounting.—*Twice a week; either semester.*
Associate Professor SCHLATTER

4b. Accounting Systems.—*Twice a week; either semester.*
Assistant Professor BAILY

5a-5b. C. P. A. Problems.—*Three times a week; both semesters.*
Professor SCOVILL

13. Governmental Accounting.—*Twice a week; either semester.*
Professor MOREY

20. Income Tax Procedure.—*Twice a week; second semester.*
Professor FILBEY

30. Budgets and Accounting Control.—*Three times a week; either semester.*
Assistant Professor THEISS

AGRONOMY

The prerequisites for graduate work for a minor in agronomy are Agronomy 25, 8, and 28, or the equivalent; and for a major in agronomy, six additional hours selected from Agronomy 7, 10, 11, 13, and 22, or the equivalent. The student with unusually good training in science may be permitted by the department to waive certain of the above-mentioned requirements.

Graduate students may specialize in soil fertility, soil physics, soil biology, plant breeding, or crop production.

Courses for Graduates

101. Soil Investigation.—*Twice a week; first semester. One unit.*
Professor DETURK

104. Seminar in Agronomy.—*Once a week; both semesters. One-fourth unit.*
Heads of Divisions

111. Soil Biology.—*Once a week; first semester. One-half to one unit.*
Professor DETURK

112. Plant Breeding.—*Twice a week; second semester. One unit.*
Professor WOODWORTH

114. Crop Production.—*Twice a week; both semesters. One unit.*
Assistant Professor DUNGAN, Professor BURLISON

118. Investigation.—A special problem is chosen by each student. Graduate students taking a thesis should so indicate in registering in Agronomy 118. *Both semesters. One-half to four units.* Professors BURLISON, DETURK, R. S. SMITH, WOODWORTH, Assistant Professor DUNGAN

119. Experiment Station Problems.—See Animal Husbandry 103.
Professor MUMFORD

Courses for Graduates and Advanced Undergraduates

7. Farm Crops.—*Three times a week; second semester.*
Assistant Professor DUNGAN, Professor BURLISON

10. Soil Physics.—*Three times a week; second semester.*
Professor R. S. SMITH

11. Soil Biology.—Lectures, laboratory, assigned reading. *Three times a week; second semester.* Assistant Professor SEARS

13. Soil Fertility.—Lectures, laboratory, assigned reading. Three times a *week; first semester.* Assistant Professor SEARS

22. Plant Breeding.—*Three times a week; first semester.*
Professor WOODWORTH, Mr. MUMM

29. Field Plot Technic.—Purpose, methods, principles of field experimentation; interpretation of results. Lectures, discussions, and problems. *Three times a week; second semester.* Professor WOODWORTH

ANIMAL HUSBANDRY

Students entering graduate work in animal husbandry must have had a thoro training in the fundamental principles of the subject either in connection with or in addition to a course of study in agriculture substantially equivalent to that offered in this University.

Students desiring to specialize in animal breeding are referred to the Zoology Department for other courses in related subjects.

Courses for Graduates

103. Experiment Station Problems.—Organization and administration of research; objects, methods, and the sources of error in experimental work. Open to graduate students in all the departments of the College of Agriculture. *Once a week; second semester. One-half unit.* Professor MUMFORD

112. Research.—Investigations along the following lines:

(a) Economic factors involved in meat production. Professor RUSK

(b) Systems of livestock farming. Associate Professor CASE

(d) Animal nutrition. The chemistry of feeding stuffs; metabolism experiments and biochemical studies connected with the nutrition of farm animals. Professor MITCHELL

(e) Animal breeding. Individual research course. Associate Professor ROBERTS

(f) Problems in poultry husbandry. Professor CARD

One to three times a week; both semesters. One-half to two units. These courses may be taken during the summer by special permission.

117. Animal Breeding.—*Two to three times a week; both semesters. One unit.* Associate Professor ROBERTS

118. Animal Nutrition Seminar.—A review of current literature in animal nutrition. *Two hours a week; both semesters. One-half unit.* Professor MITCHELL

119. Laboratory Methods in Animal Nutrition.—*Two to five times a week; both semesters. One-half to one unit.* Professor MITCHELL

120. Laboratory Methods in the Diagnosis of Animal Diseases.—*Two to five times a week; both semesters. One-half to one unit.* Professor GRAHAM

121. Laboratory Methods in Animal Breeding.—*Two to five times a week; both semesters. One-half to one unit.* Associate Professor ROBERTS

Courses for Graduates and Advanced Undergraduates

7. Principles of Animal Nutrition.—*Five times a week; first semester.* Professor MITCHELL

10. Meat.—*Three times a week; second semester.* Associate Professor BULL

22. Advanced Stock Judging.—*Five times a week; first semester.* Members of the department

24. Meat.—*Once a week; first semester.* Associate Professor BULL

26. Pork Production.—*Three times a week; first semester.* Professor CARROLL

27. Sheep Husbandry.—*Twice a week; second semester.* Assistant Professor KAMMLADE

28. History of Breeds of Live Stock.—*Three times a week; second semester.* Professor EDMONDS and other members of the department

29. Systems of Live Stock Farming.—*Twice a week; second semester.* Associate Professor WILCOX

31. Advanced Course in Animal Nutrition.—*Three times a week; second semester.* Professor MITCHELL

32. Marketing Live Stock.—The class will visit a terminal live stock market; estimated cost of the trip, $18. *Twice a week; second semester.* Associate Professor ASHBY

39. Poultry Production.—*Three times a week; second semester.* Professor CARD

40. Economics of Poultry Keeping.—*Three times a week; first semester.* Professor CARD

41. Animal Breeding.—*Three times a week; second semester.* Associate Professor ROBERTS

ARCHITECTURE AND ARCHITECTURAL ENGINEERING

The prerequisite for graduate work in architecture and architectural engineering is the equivalent of the undergraduate courses required at the University of Illinois for the degree of Bachelor of Science in architecture and architectural engineering in the branches of the subjects in which registration is desired.

Courses for Graduates

101. Architectural Construction.—*Twice a week; both semesters. One-half to one unit.* Professor PROVINE

103. Advanced Architectural Graphics.—*Twice a week; both semesters. One to two units.* Professor PROVINE, Associate Professor PALMER

104. Architectural Design.—*Twice a week; both semesters. One to four units.* Professor DILLENBACK

105. Architectural Practice.—*Twice a week; first semester. One-fourth to one-half unit.* Professor PROVINE

106. Architectural History.—Special research. *Twice a week; both semesters. Time to be arranged. One-half to two units.* Professor NEWCOMB

ASTRONOMY

The prerequisites for graduate study in astronomy are mathematics through calculus, a year's course in observational astronomy, and a course in college physics.

Courses for Graduates

101. Seminar.—*Three times a week; both semesters. One unit.* Professor BAKER

102. Stellar Astronomy.—*Three times a week; both semesters. One unit.* Professor BAKER

Courses for Graduates and Advanced Undergraduates

7. Celestial Mechanics.—*Three times a week; second semester.* Professor BAKER

9. Astrophysics.—*Three times a week; first semester.* Professor BAKER

14. Observational Astronomy.—*Three times a week; both semesters.* Professor BAKER

15. Geodetic Astronomy.—*Three times a week; second semester.* Professor BAKER

BACTERIOLOGY

Students electing bacteriology as a major study must have had at least 10 semester hours of bacteriology and 15 semester hours of some other physical or biological science. Before receiving a degree a student must have had work equivalent to courses 5a, 5b, or 20, 8, 26, 103, and 107; candidates for the doctor's degree will be held responsible for a general knowledge of the subject as applied to plant pathology, dairy husbandry (dairy bacteriology), and soil biology. Courses in these subjects are listed under their respective departments and will be counted, after conference with adviser, toward the requirements for the doctor's degree.

Candidates for the doctor's degree with a major study in some other field than bacteriology, who elect a first or second minor in bacteriology, must offer a minimum of three units for the first minor and two and one-half units for the second minor selected from the courses offered in this department, or, for satisfactory reasons, certain courses in the departments mentioned above. Some of these courses must be strictly graduate courses. Course 103 is required of candidates for the doctor's degree whether bacteriology is a major or minor study.

Courses for Graduates

103. Physiology of Bacteria.—*Twice a week; first semester. One unit.* Professor TANNER

107. Research.—For those students who are taking a major in bacteriology either for the doctor's degree or master's degree. *Both semesters. One-half to four units.* Professor TANNER

118a-118b. Current Literature.—Required of all graduate students majoring in bacteriology. *Once a week; both semesters. One-fourth unit.* Professor TANNER

The attention of students is called also to courses in bacteriology offered in other departments. Certain of these courses must be elected toward requirements for advanced degrees after conference with adviser.

Courses for Graduates and Advanced Undergraduates

8. Applied Bacteriology.—Water, sewage, and food bacteria. *Five times a week; second semester.* Professor TANNER and Dr. WALLACE

10. Epidemiology.—*Twice a week; first semester.* Dr. WALLACE

20. General Bacteriology.—For seniors and graduate students. *Five times a week; both semesters.* Professor TANNER

26. Pathological Bacteriology.—*Three times a week; first semester.* Professor TANNER and Dr. WALLACE

BOTANY

Candidates for advanced degrees in Botany must offer for admission at least 20 hours in botany, or 15 hours in botany and 5 hours in a related subject acceptable to the department. Graduate students who desire to elect botany for minor credit must offer 15 hours of botany or 10 hours of botany and 5 hours in a related subject acceptable to the department.

The department wishes to call the attention of graduate students to courses in agronomy and soils, bacteriology, chemistry, entomology, geography, geology, horticulture, mathematics, physics, physiology, and zoology which are available to advanced students and offer a broad foundation for the different phases of botanical work. The practical work in plant sciences in the College of Agriculture and the Experiment Station offers unusual facilities to the graduate student. Joint majors may be arranged in botany and agronomy.

Courses for Graduates

110. Botanical Discussions.—Required of all students and of members of the instructional staff. *Once a week; both semesters.* No credit.

112. Discussions in Plant Morphology.—*Once a week; both semesters. One-fourth unit.* Professor BUCHHOLZ

113. Discussions in Physiology.—*Once a week; both semesters. One-fourth unit.* Professor HOTTES

117. Discussions in Pathology and Mycology.—*Once a week; both semesters. One-fourth unit.* Professor STEVENS

118. Discussions in Plant Ecology and Plant Geography.—*Once a week; both semesters. One-fourth unit.* Associate Professor VESTAL

Research Courses

120. Comparative Morphology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 112 to be taken concurrently).
Professor BUCHHOLZ

122. Experimental Morphology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 112 to be taken concurrently).
Professor BUCHHOLZ

130. Physiology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 113 to be taken concurrently.) Professor HOTTES

155. Plant Geography.—*Once or twice a week; both semesters. One-half to two units.* (Botany 118 to be taken concurrently).
Associate Professor VESTAL

170. Pathology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor STEVENS

177. Mycology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor STEVENS

180. Ecology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 118 to be taken concurrently.) Associate Professor VESTAL

Courses for Graduates and Advanced Undergraduates

20. Cytology.—*Once or twice a week; second semester.* (Not given in 1930-31) Professor BUCHHOLZ

33. Physiology.—Discussions and experiments on growth, and the effect of environment on growth. *Once or twice a week; first semester.* Professor HOTTES

34. Physiology.—Discussions and experiments on respiration, and the effects of the environment and food on energy release. *Once or twice a week; first semester.* Professor HOTTES

41. Bryophytes.—Morphology and classification. *Once or twice a week; first semester.* (Given in 1930-31 and in alternate years.) Dr. HAGUE

42. Fungi.—General morphology and taxonomy. *Once or twice a week; second semester.* Professor STEVENS

43. Pteridophytes.—Comparative morphology. *Once or twice a week; first semester.* (Given in 1930-31 and in alternate years.) Professor BUCHHOLZ

44. Spermatophytes.—Comparative morphology. *Once or twice a week; second semester.* (Given in 1930-31 and in alternate years.) Professor BUCHHOLZ

45. Histology, Anatomy and Technique.—*Once or twice a week; first semester.* Professor BUCHHOLZ

46. Heredity and Evolution.—The cell in inheritance, environment, adaptation and evolution. *Once or twice a week; first semester.* (Not given in 1930-31.) Professor BUCHHOLZ

47. Morphology of Vascular Plants.—*Once or twice a week; first semester.* (Not given in 1930-31.) Professor BUCHHOLZ

55. Plant Geography of North America.—Regional divisions of North America; climate, soil, topography, vegetation, vegetational history. *Once or twice a week; first semester.* (Given in 1930-31 and in alternate years.) Associate Professor VESTAL

56. Plant Geography of the World.—Regional divisions and vegetation of continents other than North America. *Once or twice a week; first semester.* (Given in 1931-32 and in alternate years.) Associate Professor VESTAL

60. Systematic Botany.—Phylogenetic study of ferns and flowering plants. Relationship of the principal orders and families, rules of taxonomy and the identification of species. *Once or twice a week; first semester.* Mr. BOGUSCH

70. Taxonomy of Pathogenic Fungi.—Myxomycetes, Bacteria, Phycomycetes and Ascomycetes. *Once or twice a week; first semester.* Professor STEVENS

77. Taxonomy of Pathogenic Fungi.—Basidiomycetes and Fungi Imperfecti. *Once or twice a week; second semester.* Professor STEVENS

79. Methods in Pathology.—A general survey of the special methods used in Plant Pathology. *Once a week; second semester.* (Given in 1930-31 and alternate years.) Professor STEVENS

80. Ecology.—Analysis of the environmental complex; responses of plants to particular factors. *Once or twice a week; second semester.* (Given in 1930-31 and in alternate years.) Associate Professor VESTAL

88. Ecology.—Plant Communities. The units of vegetation and their composition and changes. *Once or twice a week; second semester.* (Given in 1931-32 and in alternate years.) Associate Professor VESTAL

BUSINESS LAW

Courses for Graduates and Advanced Undergraduates

10. Law of Security Relations and Banking.—*Three times a week; either semester.* Associate Professor DILLAVOU

BUSINESS ORGANIZATION AND OPERATION

Work may be done in the field of business organization and operation for a major or a minor for the M.S. degree, and for a minor for the doctorate. To do major work in this field, the student must have completed an undergraduate curriculum equivalent to that of the college of commerce and business administration. To do minor work, he must have had at least five semester hours' credit in the principles of economics, also Business Organization and Operation 1 and 2 or the equivalent; Business Organization and Operation 1 is a prerequisite for 104.

Courses for Graduates

102. Marketing Policies and Problems.—*Twice a week; both semesters. One unit.* Associate Professor CONVERSE

104. Scientific Management.—The history of the scientific management movement; critical study of the proposed systems. *Twice a week; both semesters. One unit.* Associate Professor ANDERSON

107. Sales Campaigns.—*Twice a week; both semesters. One unit.* Professor RUSSELL

129. Thesis.—*Time to be arranged; both semesters. One unit.* Professor RUSSELL and others

Courses for Graduates and Advanced Undergraduates

3. Retail and Wholesale Store Organization and Operation.—*Three times a week; second semester.* Associate Professor CONVERSE

4. Management in Manufacturing.—*Three times a week; either semester.* Associate Professor ANDERSON

7. Salesmanship.—*Twice a week; either semester.* Mr. CAGANN

8. Advertising.—*Three times a week; either semester.* Professor RUSSELL

9. Trade and Civic Organizations.—*Twice a week; second semester.*
Dean THOMPSON, Mr. KLINE

14. Problems in Industrial Management.—*Three times a week; either semester.* Associate Professor ANDERSON

17. Sales Management.—*Twice a week; second semester.*
Professor RUSSELL

18. Advertising Campaigns.—*Three times a week; second semester.*
Professor RUSSELL

20. Credits and Collections.—*Twice a week; first semester.*
Associate Professor CONVERSE

70. Operation of Public Utilities.—*Three times a week; second semester.*
Mr. ORLAND

75. Management of Public Utilities.—*Three times a week; first semester.*
Assistant Professor GRAY

CERAMIC ENGINEERING

Graduate work leading to the degrees of Master of Science and Doctor of Philosophy in chemistry (ceramic chemistry), and Master of Science and Doctor of Philosophy in ceramic engineering, are offered by the department. Graduate students who wish to elect ceramic chemistry as their major field of study must have had the equivalent of twenty-five semester hours of chemistry and this must include satisfactory courses in general chemistry, qualitative and quantitative analysis, and either physical or organic chemistry. Such students must also have had at least one year of college physics and training in mathematics which includes calculus.

The prerequisites for graduate work in ceramics or ceramic engineering are the equivalents of the undergraduate courses required for the degrees of Bachelor of Science in ceramics or ceramic engineering according to the branch of the subject in which registration is desired.

Candidates for the degree of Doctor of Philosophy with their major field of study in ceramic chemistry must fulfill the same general requirements in chemistry as candidates in other branches of chemistry.

Courses for Graduates

101. The Chemistry of the Compounds of Silicon.—*Twice a week; both semesters. One unit.* Professor PARMELEE

102. General Technology of the Clay Industries.—*Both semesters. One to two units.* Professors PARMELEE, HURSH, Associate Professor ANDREWS

103. Silicon Chemistry.—Laboratory to supplement Ceramic Engineering 101, which must precede or accompany it. *Second semester. One to two units.*
Professor PARMELEE

104. **Technology of Glass.**—*Second semester. One to two units.*
Professor PARMELEE

105. **Methods of Ceramic Research.**—*Once a week; second semester. One unit.*
Professor PARMELEE

106. **Research**—
Professors PARMELEE, HURSH, Associate Professor ANDREWS

Courses for Graduates and Advanced Undergraduates

5. **Ceramic Bodies.**—*Five times a week; first semester.* Professor PARMELEE

7. **Heavy Clay Products.**—*Three times a week; first semester.*
Associate Professor ANDREWS

8. **Glass Technology.**—*Twice a week; second semester.* Professor PARMELEE

10. **Cements.**—*Three times a week; second semester.*
Associate Professor ANDREWS

11. **Drying Clay Products.**—*Three times a week; second semester.*
Professor HURSH

14. **Glasses and Glazes.**—*Three times a week; second semester.*
Professor PARMELEE

16. **Enamels.**—*Three times a week; first semester.*
Associate Professor ANDREWS

18. **Ceramic Microscopy.**—*Three times a week; first semester.* Mr. THOMPSON

20. **Refractory Materials.**—*Twice a week; second semester.*
Professor HURSH

22. **Kilns and the Burning of Clay Products.**—*Three times a week; first semester.*
Professor HURSH

23. **Dryer and Kiln Design.**—*Twice a week; first semester.* Professor HURSH

24. **Ceramic Engineering Design.**—*Three times a week; second semester.*
Professor HURSH

28. **Pyrochemical Problems.**—*Twice a week; second semester.*
Associate Professor ANDREWS

CHEMISTRY

Graduate students whose major subject is in some department other than chemistry, before taking graduate work for credit in this department, must have had the equivalent of 15 university credits in chemistry, and the ground covered should include satisfactory work in general chemistry and in qualitative and quantitative analysis and elementary organic chemistry. Such students are advised to make selections from the following courses: Chemistry 40, 41, 42b, 43b, 27, 28b, 18b, 36b and 37b, 50a, 15a, 16a and 97a. Courses of a more special

nature will not as a rule be accepted for graduate work unless preceded by one of the courses above. Graduate students who are candidates for an advanced degree in chemistry must have had the equivalent of 25 university credits in chemistry properly distributed.

Graduate students whose major subject is in some department other than chemistry and who intend to take a first minor in chemistry or any branch of chemistry toward the Ph.D. degree must include among the courses taken, Chemistry 40 and 41, or must have had the equivalent.

Graduate students who are candidates for the M.A. or M.S. degree in chemistry must include in the courses taken, Chemistry 40 and 41 or must have had the equivalent. Graduate students who are candidates for the Ph.D. degree in any branch of chemistry must include among their courses, Chemistry 40, 41, 42b and 43b or must have had the equivalent.

Courses for Graduates

INORGANIC CHEMISTRY

101a-101b. Inorganic Chemistry.—The less familiar elements and their relationship in the periodic system. Lectures; recitations. *Twice a week; both semesters. One-half unit.* Professor HOPKINS

102a-102b. Inorganic Chemistry.—(Laboratory). Inorganic preparations and qualitative analysis of the less familiar elements. To accompany or follow Chemistry 101a-101b. *One to three times a week; both semesters. One-fourth to three-fourths unit.* Professor HOPKINS

105a-105b. Inorganic Chemistry.—(Seminary and Special Topics.) Current literature; special topics for 1930-31. Second semester: Reactions in Liquid Ammonia and the Chemistry of the Hydronitrogens (Dr. Audrieth). *One, two or three times a week; both semesters. One-fourth to one unit.*
Professor HOPKINS

QUALITATIVE AND QUANTITATIVE ANALYSIS

123a. Qualitative Analysis.—The principles and methods of analytical chemistry; theory of solutions. Lectures; exercises; reports. *Twice a week; first semester. One-half unit.* Assistant Professor REEDY

124b. Quantitative Analysis.—A modern survey of advanced principles, calculations, experimental methods and applications. Lectures, with or without laboratory. *Twice a week; first semester. One-half to one and one-fourth units.*
Professor CLARK, Assistant Professor SMITH

125a-125b. Quantitative Analysis.—(Seminar). Special topics in analytical chemistry. (Required of all students taking a major or minor in analytical chemistry). *One to three times a week; both semesters. One-fourth to one unit.*
Professor CLARK

126a. Quantitative Analysis.—(Selected topics in quantitative organic chemistry). Critical survey of methods of analysis for elementary constituents, application of polarimetry, refractometry, microscopy, optical spectroscopy, spectrophotometry and other instrumental methods. Lectures, laboratory work. *Two to five times a week; first semester. One-half to one and one-fourth units with laboratory.* Professor CLARK, Assistant Professor ENGLIS

127a-127b. Modern Applications of Radiation in Chemical and Industrial Problems.—(X-rays, radioactivity). *Twice a week; both semesters. One-half to one unit.* Professor CLARK

ORGANIC CHEMISTRY

132a. Organic Chemistry.—(First course). Review of the general reactions in organic chemistry: Problems. *Twice a week; first semester. Three-fourths unit.* Professor ADAMS

133b. Organic Chemistry.—Optical isomerism; geometric isomerism; tautomerism; etc. *Twice a week; second semester. Three-fourths unit.* Professor ADAMS

134. Organic Chemistry.—(Laboratory). Advanced preparations are selected to meet the needs of each individual in the course. Microcombustions. *Two to four times a week; both semesters. One-half to one unit.* Associate Professor FUSON

135a-135b. Organic Chemistry.—(Seminar). Current literature. (Required of all students majoring in organic chemistry). *Once a week; both semesters. One-fourth unit.* Professor ADAMS

136a. Organic Chemistry.—Special topics. *Twice a week; first semester. Three-fourths unit.* Associate Professor SHRINER

PHYSICAL CHEMISTRY

145a-145b. Physical Chemistry.—(Seminar). Recent development in physical chemistry. *Twice a week; both semesters. Three-fourths unit.* Professor RODEBUSH and staff

PHYSIOLOGICAL CHEMISTRY

150b. Physiological Chemistry.—Chemistry of intermediary metabolism. Lectures; discussions; readings. *Twice a week; second semester. Three-fourths unit.* Professor ROSE

152a-152b. Physiological Chemistry.—Difficult biochemical preparations; analytical methods; chiefly laboratory. *One to five times a week; both semesters. One-half to one unit.* Professor ROSE

155a-155b. Physiological Chemistry.—(Seminar). Current literature. (Required of all students majoring in physiological chemistry). *Twice a week; both semesters. Three-fourths unit.* Professor ROSE

INDUSTRIAL CHEMISTRY

160a-160b. Advanced Chemical Technology, and Chemical Engineering.—Recent developments in the chemical industry. Lectures. *Twice a week; both semesters. One-half unit.* Professor KEYES

161a-161b. Chemical Plant Design.—Calculations and layout of equipment for recently developed processes. *Twice a week; both semesters. One-half unit.* Associate Professor KRASE

SANITARY CHEMISTRY

186a-186b. Sanitary Chemistry.—Special problems and new developments in sanitary chemistry. *Twice a week; both semesters. One-half to one and one-fourth units.*

Professor BUSWELL

MISCELLANEOUS

190a-190b. Research.—A thesis is usually required of students taking the Master's degree and is always required of students taking the degree of Doctor of Philosophy. *Both semesters.* Work may be taken in the following subjects:

Physical and Electrochemistry—Professor RODEBUSH, Associate Professor PHIPPS, Professor CLARK, Assistant Professor REEDY

Inorganic Chemistry—Professor HOPKINS, Assistant Professor REEDY, Dr. AUDRIETH

Analytical Chemistry—Professor CLARK, Assistant Professors SMITH and ENGLIS

X-ray Chemistry—Professor CLARK

Food Chemistry—Assistant Professor ENGLIS

Organic Chemistry—Professor ADAMS, Associate Professor MARVEL, Associate Professors SHRINER, FUSON

Sanitary Chemistry—Professor BUSWELL

Physiological Chemistry—Professor ROSE, Dr. DU VIGNEAUD

Industrial Chemistry—Professor KEYES, Associate Professor KRASE

Ceramic Chemistry—Professor PARMELEE

Phyto-Chemistry—Assistant Professor ENGLIS

Courses for Advanced Undergraduates and Graduates

INORGANIC CHEMISTRY

15a. Inorganic Chemistry.—The common elements; periodic relationship; preparation and application of the common elements and compounds. Lectures; recitations. *Twice a week; first semester.*

16a. Inorganic Chemistry.—(Laboratory). Preparation of the less easily produced inorganic compounds. *Twice a week; first semester.*

QUALITATIVE AND QUANTITATIVE ANALYSIS

27. Quantitative Analysis.—Special methods and instruments; gas analysis, electrometric titration, colorimetry, and other advanced analyses. *Four times a week; both semesters.*

28b. Quantitative Analysis.—(Advanced course). Analysis of minerals, alloys and special steels. *Six times a week; second semester.*

Assistant Professor SMITH

ORGANIC CHEMISTRY

36b. Organic Chemistry.—(Second course). *Three times a week; second semester.* Associate Professor MARVEL

37b. Organic Chemistry.—(Laboratory). (Second course). Organic synthesis. To accompany 36b. *Twice a week; second semester.*
Associate Professor FUSON

38a. Qualitative Organic Analysis.—Identification of pure organic compounds and mixtures. *Twice a week; first semester.*
Associate Professor MARVEL

PHYSICAL CHEMISTRY

40. Elementary Physical Chemistry.—*Three times a week; both semesters.*
Professor RODEBUSH, Associate Professor PHIPPS

41. Elementary Physical Chemistry.—(Laboratory). To accompany Chemistry 40. *Once a week; both semesters.*
Professor RODEBUSH, Associate Professor PHIPPS and assistants

42b. Elementary Physical Chemistry.—*Three times a week; second semester.*
Associate Professor PHIPPS

43b. Elementary Physical Chemistry.—(Laboratory). *Once a week; second semester.* Associate Professor PHIPPS and assistants

44a-44b. Advanced Physical Chemistry.—Thermodynamics and free energy calculations. Atomic structure. *Twice a week; both semesters.*
Professor RODEBUSH, Associate Professor PHIPPS

49a. Chemistry of Colloids.—(Sanitary Division). Preparation and properties of colloids. Special apparatus and technique employed in colloid chemistry. *Three times a week; first semester.* Professor BUSWELL

PHYSIOLOGICAL CHEMISTRY

50a. Physiological Chemistry.—Proteins, fats, and carbohydrates; tissues, digestion, intestinal putrefaction, and feces; quantitative analysis of gastric contents, blood, milk, and urine. Lectures; laboratory. *Five times a week; first semester.* Professor ROSE, Dr. DU VIGNEAUD, and assistants

51b. Problems of Metabolism.—Micro-methods of blood and urine analysis, and their application. Lectures; laboratory. *Three times a week; second semester.* Dr. DU VIGNEAUD, and assistants

INDUSTRIAL CHEMISTRY

60a-60b. Chemical Technology.—The survey of important processes and recent developments in the chemical industry; inspection trip. (Estimated cost of this trip is $30-35 per student). Laboratory. *Four times a week; both semesters.* Mr. HOWARD

61a-61b. Principles of Chemical Engineering.—The application of scientific principles to the unit operations of chemical engineering. Lectures; laboratory. *Four times a week; both semesters.*
Professor KEYES, Associate Professor KRASE

62a. Principles of Research and Development.—The fundamental methods used in the research and development departments in chemical industry. *Twice a week; first semester.* Professor KEYES

67a-67b. Evaporation.—The theory, design and control of commercial evaporative equipment. *Twice a week; both semesters.*
Associate Professor KRASE

68a. Mechanical Separation.—Equipment for the mechanical separation of solids, liquids and gases. Theory and calculations. *Twice a week; first semester.*
Associate Professor KRASE

69b. Flow of Gases and Liquids.—Fundamental theory and application. The design of measuring devices and other equipment. *Twice a week; second semester.* Associate Professor KRASE

70b. Humidification and Drying.—Calculations and mathematical studies of humidifiers and driers. *Twice a week; second semester.* (Not given 1930-31).
Mr. HOWARD

71a. Sampling, Grinding, and Mixing.—Fundamental principles involved and mathematical calculations. *Once a week; first semester.* Mr. HOWARD

72b. Distillation.—Calculations in the operation and design of distillation equipment. *Twice a week; second semester.* Mr. HOWARD

73a. Metallurgy.—Manufacture of iron and steel. *Three times a week; first semester.* Mr. HOWARD

74b. Metallurgy and Metallography.—General metallurgy of iron and steel; physical characteristics and microstructure of metals and alloys. Lectures; laboratory. *Three times a week; second semester.* Mr. HOWARD

SANITARY CHEMISTRY

86b. Chemistry of Sanitation.—Lectures, demonstrations, and field trips covering the field of water purification, sewage treatment, and general sanitation. *Three times a week; second semester.* Professor BUSWELL, Mr. SYMONS

49a. Chemistry of Colloids.—(See physical division).

MISCELLANEOUS COURSES

92a. Chemical Literature and Reference Work.—*Once a week; first semester.* Dr. BARTOW

95a. History of Science with Particular Reference to Chemistry.—Lectures; reading. *Twice a week; first semester.* Professor RODEBUSH and others

97b. Food Analysis.—Quantitative organic analysis of food products; alcohols, carbohydrates, fats and oils, cereals, nitrogenous bodies, preservatives, and colors. *Six times a week; second semester.*
Assistant Professor ENGLIS and assistant

CIVIL ENGINEERING

The prerequisite for graduate work in civil engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in civil engineering in the branches of the subject in which registration is desired.[1]

Courses for Graduates

101. Water Supply Engineering.—*Twice a week; first semester. One unit.*
Professor BABBITT

102. Sewerage.—*Twice a week; second semester. One unit.*
Professor BABBITT

103. Highway Construction.—*Twice a week; first semester. One unit.*
Professor CRANDELL

104. Municipal Engineering.—*Twice a week; second semester. One unit.*
Professor CRANDELL

105. Advanced Reinforced Concrete Theory.—*Twice a week; first semester. One unit.* Professor CROSS

106. Reinforced Concrete Structures.—*Twice a week; first semester. One to three units.* Professor CROSS

107. Statically Indeterminate Structures and Secondary Stresses.—*Twice a week; first semester. One unit.* Professor WILSON

108. Advanced Bridge Design.—*Twice a week; second semester. One or two units.* Professor CROSS

109. Water Purification and General Sanitation.—*Twice a week; first semester. One unit.* Professor BABBITT

110. Sewage Disposal, Wastes Disposal and General Sanitation.—*Twice a week; second semester. One unit.* Professor BABBITT

112. Masonry Construction and Foundations.—*Twice a week; second semester. One unit.* Professor HUNTINGTON

124. Steel Building Construction.—*Twice a week; first semester. One or two units.* Professor HUNTINGTON

125. Advanced Design of Industrial Structures.—*Twice a week; second semester. One unit.* Dean KETCHUM

130. Advanced Hydrology.—*Twice a week; first or second semester. One unit.* Associate Professor PICKELS

[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other fields.

131. **Waterpower Engineering.**—*Twice a week; second semester. One unit.*
Assistant Professor DOLAND

140. **Research.**—*First or second semester. One-half to two units.*
Members of the Department

Courses for Advanced Undergraduates and Graduates

63. **Statically Indeterminate Structures.**—The elastic theory and its applications in statically indeterminate structures. *Three times a week; first semester.*
Professor CROSS

64. **Statically Indeterminate Structures.**—A continuation of course 63. *Three times a week; second semester.* Professor CROSS

See also Mechanics, Theoretical and Applied, and Railway Engineering.

THE CLASSICS

The Degree of Master of Arts in the Classics.—The major may be either Latin or Greek.

The Degree of Doctor of Philosophy in the Classics.—The degree is given in classical philology. Major work may be taken in either Latin or Greek, but which ever language is taken as a major, the other must be taken as a first minor.

GREEK

Preparation for first-year graduate work in Greek must include at least two years of preparatory Greek, two years of college Greek, and two years of college Latin. A reading knowledge of French and German is important for candidates in this subject. The study of history and philosophy is especially recommended.

Courses for Graduates

106. **Greek Drama.**—*Twice a week; second semester. One unit.*
Associate Professor PERRY

110. **Bibliography and Criticism.**—(Thesis course; the same as Latin 110). *Once a week; both semesters. One unit.* Professors OLDFATHER and PERRY

121. **Thucydides.**—*Twice a week; first semester. One unit.*
Associate Professor PERRY

Courses for Graduates and Advanced Undergraduates

6. **Thucydides and Plato.**—*Three times a week; first semester.* Dr. COUCH

8. **Greek Oratory, Aristotle, and Theocritus.**—*Three times a week; second semester.* Dr. COUCH

14. **Greek Composition.**—*Once a week; second semester.* Dr. COUCH

LATIN

Preparation for first year graduate work in Latin must include at least two years of preparatory Latin and four years of college Latin. A reading knowledge of French and German is important. Some acquaintance with Greek is highly desirable, and the study of history and philosophy is especially recommended.

Courses for Graduates

104. Latin Paleography.—*Twice a week; first semester. One unit.*
Professor OLDFATHER

110. Bibliography and Criticism.—(Thesis course; the same as Greek 110). *Once a week; both semesters. One unit.* Professors OLDFATHER and PERRY

114. Caesar.—*Twice a week; second semester. One unit.*
Professor OLDFATHER

117. Lucretius.—*Twice a week; second semester. One unit.*
Associate Professor PERRY

118. The Latin Romance.—*Twice a week; first semester. One unit.*
Associate Professor PERRY

Courses for Graduates and Advanced Undergraduates

21. Tacitus (Annales); Juvenal.—*Three times a week; first semester.*
Mr. HEIRONIMUS

22. Martial, Suetonius, and Apuleius.—*Three times a week; second semester.* Mr. HEIRONIMUS

10. Latin Composition.—*Twice a week; second semester.* Mr. HEIRONIMUS

DAIRY HUSBANDRY

Candidates for advanced degrees in dairy husbandry must have had adequate training in collegiate courses dealing with the principles of the subject which the candidate elects as his major.

Candidates registering in dairy husbandry as a major subject must register for one minor in a subject closely related to the major, and this may under certain conditions and with proper approval be a division of the major field of study. However, in such cases, this will constitute a second minor.

It is recommended that at least one minor be selected in a field outside the College of Agriculture.

Students desiring to specialize in plant breeding (or animal breeding) are referred to the Zoology Department for the fundamental courses in Genetics.

Courses for Graduates

101. Economic Milk Production.—*Twice a week; both semesters. One-half to two units.* Professor FRASER

104. Dairy Bacteriology.—Fermentation in dairy products. *Both semesters. One-half to one unit.* Professor PRUCHA

105. **Dairy Manufactures.**—*Both semesters. One-half to two units.*
Professor RUEHE

106. **Dairy Bacteriology.**—Research on assigned problems. *Both semesters. One-half to two units.* Professor PRUCHA

107. **Dairy Chemistry.**—Assigned problems. *Both semesters. One-half to two units.* Assistant Professor OVERMAN

108. **Physiology of Lactation.**—*Once a week; both semesters. One-half to two units.* Professor GAINES

112. **Research.**—*Both semesters, one to four units.* Special problems along the following lines:

(a) **Dairy Bacteriology.** Professor PRUCHA
(b) **Dairy Chemistry.** Assistant Professor OVERMAN
(c) **Dairy Cattle Breeding.** Professor YAPP
(d) **Dairy Cattle Feeding.** Associate Professor NEVENS
(e) **Milk Production.** Professor GAINES
(f) **Dairy Manufactures.** Professor RUEHE

NOTE: Graduate students writing a thesis should so indicate in registering in Dairy Husbandry 112.

Courses for Graduates and Advanced Undergraduates

4. **Ice Cream Making.**—*Four times a week; first semester.*
Assistant Professor TRACY

5. **Composition of Dairy Products.**—*Three times a week; second semester.*
Assistant Professor OVERMAN

7. **Creamery Buttermaking and Factory Management.**—*Five times a week; second semester.* Professor RUEHE

10. **Dairy Bacteriology.**—*Three times a week; first semester.*
Professor PRUCHA, Assistant Professor BRANNON

14. **Milk Condensing.**—*Three times a week; second semester.*
Assistant Professor TRACY

17. **Advanced Study of Dairy Breeds.**—*Three times a week; first semester.*
Professor YAPP

20. **Economic Problems in Dairy Farming.**—*Three times a week; first semester.* Professor FRASER

21. **Economic Milk Production.**—*Three times a week; second semester.*
Professor FRASER

25. **Advanced Dairy Cattle Feeding.**—*Twice a week; first semester.*
Associate Professor NEVENS

ECONOMICS

Every student entering on major graduate work in economics must have had a course in the principles of the science and also in some special part of the field such as public finance or money and banking. The work must represent at least eight semester hours. He must have had at least one semester's work in English, American, or general European history; and at least three hours in political science.

Those who take the subject as a minor must have had a course of at least five semester hours in the principles.

Graduate students who are making economics their major are required during their first year to acquaint themselves with the works of the masters in the science, by taking either course 101 or 103. In the same or subsequent year they are expected to elect the fundamental courses in some other divisions of the field of economics, as indicated by the divisions listed in the Economic Seminar, course 118. One of the minors for the doctor's degree may be taken in a separate division of economics; the other must be taken out of the department, and preferably outside of the College of Commerce.

The following courses may be taken by students in general economics for major or minor credit; all numbered above 100; 4, 10, 11, 13, 14, 15, 17, 24, 25, 29, 30, 41, 42, 43, 44, 51, 52, 55, 61, 71, 72, 81. The following may be taken for minor credit only: 8, 9, 31, 36, 56, 82.

Two units will be accepted for a first minor for the master's degree; and four two or three-hour graduate courses, or their equivalent in advanced undergraduate courses, for a first minor for the doctor's degree.

Courses in transportation may be included in their programs by students of Economics as part of their major; courses in transportation, accountancy, and business organization and operation may be used to satisfy the requirements for the minor. See Business Organization and Operation, and Transportation.

Courses for Graduates

101. Economic Theory.—*Three times a week; both semesters. One unit.*
Professor WESTON

102. Theory of Money, Credit, and Prices.—*Twice a week; both semesters. One unit.*
Professor WESTON

103. The Distribution of Wealth.—*Twice a week; both semesters. One unit.* (Not given in 1930-31.)
Professor WESTON

104a. Theories and Policies of International Trade.—*Twice a week; first semester. One unit.*
Professor LITMAN

104b. Organization of International Trade.—*Twice a week; second semester. One unit.*
Professor LITMAN

105. Public Finance.—*Twice a week; both semesters. One unit.*
Professor HUNTER

106. International Exchange and the Money Markets.—*Twice a week; second semester. One unit.*
Associate Professor WRIGHT

107. The Corporation in Economic Evolution.—*Twice a week; both semesters. One unit.*
Assistant Professor WASSERMAN

109. Comparison of the Theory and Practice of the leading Central and Reserve Banks with special reference to England, Germany, France, and the United States.—A comparative study. *Twice a week; first semester. One unit.*
Associate Professor WRIGHT

110a. Finance and Investments: Fundamental Principles Applied to Business Units of a Simple Character.—*Twice a week; both semesters. One unit.* (Not given in 1930-31).
Professor ROBINSON

110b. Finance and Investments: Complex Business Units.—*Twice a week; both semesters. One unit.*
Professor ROBINSON

112. Labor Problems.—*Twice a week; both semesters. One unit.*
Assistant Professor BERMAN

Arranged in a two-year cycle:

1930-31: *first semester,* Social aspects of Labor; *second semester,* Trade Unionism.

1931-32: *first semester,* Socialism and Economic Reform; *second semester,* Labor and the Law.

118. Seminar.—Thesis Course. (All graduate students writing theses in Economics must register in Economics 118; registration for other students is optional.)

(a) Third Year: Seminar. Professor WESTON

(b) First Year: General Economics. Assistant Professor BROWN

(c) First Year: Agricultural Economics. Associate Professor STEWART

(d) First Year: Public Utilities. Assistant Professor GRAY

120. History of Economic Thought.—*Twice a week; both semesters. One unit.*
Professor WESTON

122. Economic History of the United States.—*Twice a week; both semesters. One unit.*
Professor BOGART

124. International Finance.—*Twice a week; both semesters. One unit.*
Professor LEE

130. Theory of Agricultural Economics.—*Twice a week; both semesters. One unit.*
Associate Professor STEWART

131. Agricultural Resources and Prices.—*Twice a week; both semesters. One unit.*
Assistant Professor NORTON

132. Agricultural Economics Research.—Only those who write acceptable theses will receive credit. *Once a week; both semesters. One to two units.*
Associate Professor STEWART

143. The Administration of Industrial Relations.—*Twice a week; both semesters. One unit.*

Theory of Statistics.—See Mathematics 129.

144. **Statistical Theory and Analysis.**—*Twice a week; both semesters. One unit.* Assistant Professor NORTON

180. **Management of Public Utilities.**—*Twice a week; both semesters. One unit.* Assistant Professor GRAY

Courses for Graduates and Advanced Undergraduates

4. **History of Money and Banking Institutions, with particular reference to the United States.**—*Three times a week; first semester.* Professor LEE

8. **Domestic and Foreign Exchange and the Money Markets.**—*Three times a week; second semester.* Associate Professor WRIGHT

9. **Advanced Theory and Practice of Banking.**—*Three times a week; first semester.* Associate Professor WRIGHT

10. **Corporation Finance and Management.**—*Three times a week; second semester.* Professor ROBINSON

11. **Industrial Consolidation.**—Development; plans for controlling trusts. *Three times a week; first semester.* Professor ROBINSON

13. **Marketing and Prices of Agricultural Products.**—*Three times a week; first semester.* Associate Professor STEWART

14. **Cooperation in Agriculture.**—*Twice a week; second semester.* Dr. BARTLETT

15. **Financing Agriculture.**—*Three times a week; second semester.* Assistant Professor NORTON

17. **Economic History of Agriculture.**—*Twice a week; first semester.* Assistant Professor NORTON

18. **Land Economics.**—*Three times a week; second semester.* Associate Professor STEWART

24. **Economic Development of Modern Europe.**—*Three times a week; second semester.* Professor BOGART

25. **Economic History of England.**—*Three times a week; first semester.* Professor BOGART

29. **International Commerce and Commercial Policies.**—*Three times a week; second semester.* Professor LITMAN

30. **World Markets.**—*Three times a week; second semester.* Professor LITMAN

31. **Organization of International Commerce.**—*Three times a week; first semester.* Professor LITMAN

35. **Corporation Finance.**—*Three times a week; first semester.* Assistant Professor BROWN

36. **Investments.**—*Three times a week; second semester.*
Professor Robinson

41. **Labor Problems.**—*Three times a week; first semester.*
Assistant Professor Berman

42. **The Labor Movement.**—*Three times a week; second semester.*
Assistant Professor Berman

43. **Personnel Administration.**—*Three times a week; second semester.*
Assistant Professor Berman

44. **Socialism and Economic Reform.**—*Three times a week; first semester.*
Assistant Professor Berman

51. **Public Finance.**—*Three times a week; first semester.*
Professor Hunter

52. **Problems in Taxation, with Special Reference to Illinois.**—*Three times a week; second semester.*
Professor Hunter

55. **Economics of Insurance (Life).**—*Three times a week; first semester.*
Dr. Dickinson

56. **Economics of Insurance (Property).**—*Three times a week; second semester.*
Dr. Dickinson

58. **Urban Land Economics.**—*Three times a week; first semester.*
Dr. Dickinson

61. **Economic Theory.**—*Twice a week; both semesters.*
Assistant Professor Wasserman

71. **Economic Statistics.**—*Three times a week; first semester.*
Assistant Professor Norton

72. **Economic Statistics. (Business Barometers).**—*Three times a week; second semester.*
Assistant Professor Norton

81 **Principles of Public Utilities.**—*Three times a week; first semester.*
Assistant Professor Gray

82. **Regulation of Public Utilities.**—*Twice a week; both semesters.*
Associate Professor Dillavou

83. **Public Utility Rates.**—*Three times a week; second semester.*
Assistant Professor Gray

EDUCATION

Students who elect education as a major subject must have completed at least a three-hour course in the principles of education, a course of at least the same length in the history of education, and a minimum of three hours each in

psychology and philosophy. For graduate students who have had experience in teaching these requirements may be modified.

Courses for Graduates

101. Educational Theory.—*Twice a week; one hour; second semester. One unit.* Professor CAMERON

102. Research in History of American Education.—*Once a week; two hours; both semesters. One unit.* Professor SEYBOLT

104. Educational Administration.—*Twice a week; one hour; first semester. One unit.* Dean CHADSEY

106. High School Administration.—*Once a week; two hours; first semester. One unit.* Professor CLEMENT

110. Methods of Teaching.—*Once a week; two hours; first semester. One unit.* Professor MONROE

119. Curriculum Construction.—*Once a week; two hours; second semester. One unit.* Professor MONROE

120a. Supervision in Secondary Education.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

121. Educational Measurement.—*Once a week; two hours; second semester. One unit.* Associate Professor ODELL

123. Educational Statistics.—*Once a week; two hours; first semester. One unit.* Associate Professor ODELL

124. Theory of Educational Research.—*Once a week; two hours; first semester. One unit.* Professor MONROE

125. Educational Psychology.—*Once a week; two hours; first semester. One unit.* Professor CAMERON

125a. Educational Psychology.—*Once a week; two hours; second semester. One unit.* Professor CAMERON

127. High School Curricula.—*Once a week; two hours; first semester. One unit.* Professor CLEMENT

129. The Junior College.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

131. Analysis and Evaluation of High School Texts.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

133. Studies in Secondary Education.—*Once a week; two hours; first semester. One unit.* Professor CLEMENT

141. Problems in the Teaching of English in the Secondary School.—*Once a week; two hours; both semesters. One unit.* Professor PAUL

150. Thesis.—*Both semesters. One or two units.* Dean CHADSEY and others

170. Public School Business Administration.—*Once a week; two hours; second semester. One unit.* Assistant Professor WEBER

Courses for Graduates and Advanced Undergraduates

4. Problems of Educational Administration.—Interpretation of present tendencies. *Three times a week; first semester.* Assistant Professor WEBER

11. Ancient and Medieval Education.—*Twice a week; first semester.* Professor SEYBOLT

18. Educational Measurements.—*Three times a week; both semesters.* Associate Professor ODELL

20a. Supervision of Secondary Education.—*Twice a week; first semester.* Professor CLEMENT

26. The Junior High School.—*Twice a week; second semester.* Professor CLEMENT

27. High School Curricula.—*Twice a week; second semester.* Professor CLEMENT

30. History of American Education.—*Twice a week; second semester.* Professor SEYBOLT

41. Vocational Education.—*Three times a week; first semester.* Professor MAYS

42. Special Education.—*Twice a week; first semester.* Dr. DOLCH

43. Mental Tests.—*Three times a week; second semester.* Professor CAMERON

44. Educational Psychology.—(Laboratory Course.) *Three times a week; first semester.* Professor CAMERON

49. Principles of Intellectual Development.—*Three times a week; second semester.* Associate Professor GRIFFITH

53. Problems of Industrial Education.—*Three times a week; both semesters.* Professor MAYS

54. Function and Methods of Part-time Teaching.—*Twice a week; first semester.* Professor MAYS

54a. Curriculum Construction in the Part-time Schools.—*Twice a week; second semester.* Professor MAYS

55. Problems of Vocational Guidance.—*Three times a week; second semester.* Professor MAYS

ELECTRICAL ENGINEERING

The prerequisite for graduate work in electrical engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in

electrical engineering in the branches of the subject in which registration is desired.

Graduate students who wish to take a minor in electrical engineering must have had differential and integral calculus, and one year's work in college physics.

Courses for Graduates[1]

101. Advanced Course in Alternating Currents.—The theory of transient phenomena; polyphase circuits; measuring apparatus. *Twice a week; both semesters. One and one-half units.* Professors PAINE, REICH

103. Electrical Designs.—*Twice a week; second semester. One unit.* Assistant Professor WALDO

105. Electrical Engineering Research.—*Twice a week; both semesters. One to three units.* Professors PAINE, TYKOCINER, BROWN, REICH

ENGLISH LANGUAGE AND LITERATURE

Students who enter on graduate work with English as their major subject are required to give evidence of their ability to write good English. They must present the equivalent of fourteen hours of undergraduate work in English literature, the required college work in rhetoric, and the equivalent of four semesters of college work in Latin, or in Greek, or in French, or in German. After the first year of graduate work a knowledge of French and German is indispensable.

Students making English their minor may be admitted to such courses as in the judgment of the instructor in charge they are qualified to pursue.

The Degree of Master of Arts in English.—In addition to complying with the general rules of the Graduate School, candidates for the degree of Master of Arts in English must comply with the following rules of the Department of English: (1) they must choose a portion of their work from the group of courses described as "for graduates;" (2) must offer an elementary course in Anglo-Saxon; and (3) must take besides the regular semester examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The degree of Master of Arts in Public Speaking. Candidates for the degree of Master of Arts in Public Speaking must comply with the following regulations: (1) They must satisfy the general requirements of the Department of English for admission to graduate work; (2) must offer a minor in English of not less than two units selected from 100 courses in English literature; (3) must take, besides the regular examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Doctor of Philosophy in English.—Candidates for the degree of Doctor of Philosophy in English may expect to be examined on the entire field of the English language and literature. They are urged, furthermore, to acquaint themselves as fully as possible with the history and philosophy of the period in which their main interest lies, and with the foreign languages and literatures most closely related to English and that period.

[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other departments.

Courses for Graduates

101. Research in Special Topics.—*One or two units.*
Professors GRAHAM, EATON, FLOM, PAUL, E. C. BALDWIN, T. W. BALDWIN; Associate Professors H. S. V. JONES, HILLEBRAND, JEFFERSON; Assistant Professors RINAKER, PARRY, SECORD, FLETCHER, FINNEY

111. Caedmon and Cynewulf.—*Twice a week; first semester.*
Associate Professor JONES

121. History of Rhetorical Theory.—*Twice a week; both semesters. One unit.* (Not given in 1930-31).

129. English Literature from the Norman Conquest to 1400.—*Twice a week; both semesters. One unit.* Associate Professor JONES

130. Tragedy.—*Twice a week; both semesters. One unit.*
Associate Professor HILLEBRAND

135. Problems in American Literature.—*Twice a week; first semester. One unit.* Professor PAUL

137. Prose Writers of the Nineteenth Century.—*Twice a week; both semesters. One unit.* (Not given in 1930-31).

138. The Romantic Movement.—*Twice a week; both semesters. One unit.*
Professors GRAHAM and EATON

140. Investigations in Modern English Literature.—(For second-year and third-year graduate students who are preparing theses for the Doctor's Degree.) *Three hours, once a week; both semesters. One to three units.* (May be taken in successive years.) Professor GRAHAM

141. Literature of the Seventeenth Century.—*Twice a week; both semesters. One unit.* Professor E. C. BALDWIN

143. The History and Theory of Prose Fiction.—*Two hours, once a week; both semesters. One unit.* (Not given in 1930-31).

145. Studies in Eighteenth Century Literature.—*Twice a week; both semesters. One unit.* Professors GRAHAM and EATON

147. Shakspeare and Elizabethan Drama.—Critical Study of the Chief Plays. *Twice a week; both semesters. One unit.* Professor T. W. BALDWIN

148. Seminar in Elizabethan Drama.—*Twice a week; second semester. One unit.* Professor T. W. BALDWIN

151. The Literature of Travel and Biography in Relation to Prose Fiction.—*Twice a week; second semester. One unit.* Assistant Professor SECORD

Courses for Graduates and Advanced Undergraduates

A. ENGLISH LANGUAGE AND LITERATURE

3. The Poetry of Milton.—*Three times a week; second semester.*
Professor E. C. BALDWIN

4. **English Versification.**—*Three times a week; first semester.*
Assistant Professor LANDIS

5. **Shakspeare.**—*Three times a week; each semester.*
Professor T. W. BALDWIN

8. **Old English (Anglo-Saxon).**—*Three times a week; first semester.*
Professor FLOM

9. **Beowulf.**—*Three times a week; second semester.*
Associate Professor JONES

17. **History of the English Language.**—*Three times a week; second semester.*
Professor FLOM

25. **Chaucer.**—*Three times a week; first semester.*
Associate Professor JONES

26. **Spenser.**—*Three times a week; second semester.*
Associate Professor JONES

30. **Some American Novelists Since 1870.**—*Three times a week; second semester.*
Dr. TUPPER

31. **English Literature from 1688 to 1789.**—*Three times a week; second semester.*
Professor GRAHAM

33. **English Literature from 1789 to 1837.**—*Three times a week; second semester.*
Professor EATON

35. **The English Drama (Previous to Shakspeare).**—*Three times a week; first semester.*
Professor T. W. BALDWIN

36. **The English Drama (exclusive of Shakspeare) from 1600 to 1700.**—*Three times a week; second semester.*
Professor HILLEBRAND

38. **The Arthurian Tradition.**—*Three times a week; second semester.*
Assistant Professor PARRY

39. **Introduction to Medieval Literature.**—*Three times a week; first semester.*
Assistant Professor PARRY

43. **Browning.**—*Three times a week; first semester.*
Assistant Professor KYLE

45. **The Development of the Modern Drama.**—*Three times a week; first semester.*
Associate Professor HILLEBRAND

52. **The Great Novelists of the Nineteenth Century.**—(Scott, Jane Austen, Dickens, Thackeray, Hawthorne, Eliot, Meredith, Hardy, Stevenson).—*Three times a week; second semester.* (Not given in 1930-31).

54a-54b. Introduction to Comparative Literature.—*Three times a week; both semesters.*

Professors Oldfather, Oliver, Aron; Associate Professor Hamilton; Assistant Professors Van Horne, Landis, Perry, Parry, Associate Palfrey.

56. Tennyson.—*Three times a week; first semester.* Professor Graham

57. Great Foreign Novelists in Relation to the English Novel.—(Goethe, Hugo, Manzoni, Balzac, Dumas, Flaubert, Zola, Turgenev, Dostoevski, Tolstoi). *Twice a week.* (Not given in 1930-31).

B. RHETORIC

17. Advanced Composition.—*Three times a week; first semester.*
Assistant Professor Rinaker

C. PUBLIC SPEAKING

4. Advanced Debating.—*Three times a week; both semesters.*
Associate Professor Sandford

6. Persuasion and the Forms of Public Address.—*Three times a week; first semester.* Associate Professor Sandford

7. Masters of Public Address.—*Three times a week; second semester.*
Associate Professor Sandford

8. Dramatization.—*Three times a week; first semester.* Mr. Swanson

11. Play Production.—*Three times a week; second semester.*
Mr. Swanson

D. SCANDINAVIAN LANGUAGES

Preparation for major graduate work in the Scandinavian languages or literature must include a good knowledge of one of the Scandinavian languages and systematic work in the undergraduate courses in Scandinavian. Any graduate student in language may, however, be admitted to the purely philological courses.

Courses for Graduates

101. Old Norse.—Introduction to the language; grammar; reading of the *Prose Edda* in part, and selections from the sagas. *Twice a week; both semesters. One unit.* Professor Flom

102. Old Danish and Interpretation of Oldest Runic Inscriptions.—*Twice a week; second semester. One unit.* (Not given in 1930-31). Professor Flom

110. Advanced Old Norse (Old Norse Poetry).—Critical study of the *Poetic Edda. Twice a week; both semesters. One unit.* Professor Flom

130. The Runic Inscriptions (Introduction to Primitive Germanic.)—*Twice a week; second semester. One unit.* (Not given in 1930-31). Professor Flom

150. Research.—Special problems in Scandinavian philology or literature. *Once a week. One-half to one unit.* Professor Flom

ENTOMOLOGY

The prerequisite for graduate work in entomology is two years of undergraduate biology, including zoology and entomology. Entrance on major work in entomology requires at least six hours of entomology. A reading knowledge of French and German is desirable by the beginning of the second year.

Courses for Graduates

102. Research in the Morphology and Embryology of Insects.—*Once or twice a week; both semesters. One-half to two units.*
Associate Professor HAYES

107. Insect Anatomy.—Lectures and laboratory. *Three times a week; both semesters. One-half unit.* Associate Professor HAYES

108. Research in Economic Entomology.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

109. Research in Systematic Entomology.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

110. Research in the Biology and Ecology of Insects.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

Courses for Graduates and Advanced Undergraduates

6. Special Problems.—*Once or twice a week; both semesters.*
Various Instructors

10. Morphology and Taxonomy of Immature Insects.—Lectures and laboratory. *Three times a week; both semesters.* (Given in 1929-30 and in alternate years). Associate Professor HAYES

20. Insect Control.—Lectures and laboratory. *Three times a week; first semester.* Professor METCALF

21. Insect Bionomics.—Lectures and reading. *Three times a week; second semester.* Professor METCALF

FARM ORGANIZATION AND MANAGEMENT

Graduate work in Farm Organization and Management leading to a degree of Master of Science is open to students who have had a thoro training in the fundamental principles of the subject, either in connection with, or in addition to a course of study in agriculture substantially equivalent to that offered in this University. Such students must have had at least 8 hours of Economics.

In order to qualify for a master's degree in Farm Organization and Management, a student must take at least 2 units of work in Economics courses, either as part of his major, or as his first minor. Also, the student must take not less than three units of work from 100 courses in Farm Organization and Management. For courses in other departments which count as a major in Farm Organization and Management see Animal Husbandry 29, 112b Economics 13, 14, 18, 130, and 131.

Courses for Graduates

101. Farm Organization and Management.—A study of principles, including an historical study of the contributions to the farm management field. *Twice a week; both semesters. One unit.* Associate Professor CASE

110. Farm Organization and Management Research.—Only those who write acceptable theses will receive credit. *Once a week; both semesters. One to two units.* Associate Professor CASE

Courses for Graduates and Advanced Undergraduates

4. Farm Operation.—*Twice a week; first semester.* Mr. ROSS

5. Farm Organization.—*Three times a week; second semester.* Associate Professor CASE

6. Land Tenure.—*Twice a week; first semester.* Associate Professor CASE

GENETICS

(See Zoology)

GEOLOGY

For graduate work in geology the student must have had at least a major in geology and an acceptable field training. Other graduate students with adequate technical preparation may be admitted to certain graduate courses.

For graduate work in geography the student must have had at least the equivalent of a major in geography.

Courses for Graduates

101. Advanced Crystallography.—*Twice a week; both semesters. One unit.* Professor BAYLEY

102. Igneous Petrography.—Lectures; laboratory. *Twice a week; both semesters. One unit.* Professor BAYLEY

103. Metamorphic Petrography.—Lectures; laboratory. *Twice a week; first semester. One unit.* (Not given in 1930-31). Professor BAYLEY

104. Pre-Cambrian Stratigraphy.—*Twice a week; second semester. One unit.* Professor QUIRKE

108. Ore Deposition.—Problems in the origin of ore deposits, as illustrated by selected mining districts. *Three times a week; both semesters. One unit.* (Not given in 1930-31). Professor BAYLEY

125. Sedimentation.—The interpretation of sedimentary rocks in terms of their origin. *One unit.*

135. Research.—*Once a week; both semesters. One-half to four units.*
Professors BAYLEY, SAVAGE, and QUIRKE; Associate Professor BLANCHARD, and Assistant Professor HOWARD

142. Stratigraphic Paleozoic Paleontology.—The invertebrate index fossils of the successive geologic formations. *Twice a week; both semesters. One unit.*
Professor SAVAGE

143. Post-Paleozoic Stratigraphic Paleontology. — Stratigraphic study of post-Paleozoic formations with a consideration of characteristic fossils. *Twice a week; both semesters. One unit.* Assistant Professor SUTTON

151. Advanced Dynamic Geology.—A critical analysis of geologic processes and their results; the materials and structure of the earth; problems of geologic interpretations. *Three times a week; first semester. One unit.*
Professor QUIRKE

152. Advanced Historical Geology.—Cosmogeny; the record of diastrophism; the development of the continents and oceans; the relationship between oceanic fluctuations and organic differentiation and evolution; physiographic, climatic, and organic history. *Three times a week; second semester. One unit.*

160. The Principles of Petroleum Geology.—*Twice a week; both semesters. One unit.* Assistant Professor HOWARD

161. Applied Petroleum Geology.—*Twice a week; second semester. One unit.* Assistant Professor HOWARD

162. The Theory and Application of Geophysical Methods.—*Twice a week; first semester. One unit.* Assistant Professor HOWARD

Courses for Graduates and Advanced Undergraduates

A. GEOLOGY

9. Invertebrate Paleontology.—*Three times a week; first semester.*
Professor SAVAGE

15. Structural Geology.—Rock deformation and its results. *Three times a week; first semester.* Assistant Professor SHEPARD

16. Stratigraphy.—Fossil faunas, with special reference to Paleozoic invertebrates. *Three times a week; second semester.* Assistant Professor SUTTON

22. Mountain and Continental Structures.—*Three times a week; second semester.* Assistant Professor SHEPARD

38. Regional Geology of the United States.—The characteristics of individual geologic provinces. Recitations. *Three times a week; second semester.*
Assistant Professor HOWARD

47. Systematic Mineralogy.—*Three times a week; first semester.*
Professor BAYLEY

48. Silicate Minerals and Rocks.—*Five times a week; second semester.*
Professor BAYLEY

49. Microscopic Mineralogy.—*Five times a week; second semester.*
Assistant Professor HOWARD

60a-60b. Introduction to Research.—*Two or four times a week; both semesters.* Members of the Department

95. Economic Geology.—The nature, occurrence, origin, and uses of coal, oil, building stones, and bedded deposits of economic importance. *Three times a week; first semester.* Assistant Professor HOWARD

96. Economic Geology.—The nature, occurrence, and origin of metaliferous deposits. Theories of ore deposition. *Three times a week; second semester.* Professor QUIRKE

B. GEOGRAPHY

5. Geography of South America.—*Three times a week; first semester.* Associate Professor BLANCHARD

8. Geography of Europe.—*Three times a week; second semester.* Associate Professor BLANCHARD

12. Historical Geography of the United States.—*Three times a week; second semester.* Dr. BURGY

53a-53b. Advanced Economic Geography.—*Three times a week; both semesters.* Associate Professor BLANCHARD

GERMAN

Germanic Languages and Literature

Students desiring to take German as a major are required to have finished successfully a four-year course of undergraduate work in German, or its equivalent. They are also required to be familiar with the principal works of the writers of the classical and modern periods of German literature, to show a general knowledge of the history of German literature, and to be able to follow lectures in the German language.

Of collateral subjects, a reading knowledge of French is important and is required for advanced graduate work. Some acquaintance with Latin and with German history is highly desirable.

Courses for Graduates

101. Seminar in the Modern German Drama.—*Twice a week; both semesters. One unit.* Professor ARON

102. Thesis.—*Both semesters. One-half to two units.* Professors ARON, BROOKS; Associate Professor WILLIAMS

103. Introduction to the Historical Study of the Germanic Languages.—History of German philology; comparative grammar of the old Germanic dialects. *Twice a week; first semester. One unit.* Associate Professor WILLIAMS

105. Old High German.—Grammar and interpretation of the oldest literary documents. *Twice a week; second semester. One unit.* Associate Professor WILLIAMS

110. Early German Drama.—German drama up to the Reformation. *Twice a week; second semester. One unit.* Professor BROOKS

113. German Literature of the Fifteenth and Sixteenth Centuries.—*Twice a a week; first semester. One unit.* Professor BROOKS

117. German Literature of the Seventeenth and Eighteenth Centuries.—*Twice a week; both semesters. One unit.* Professor ARON

121a. The Nibelungenlied.—*Twice a week; second semester. One unit.* Associate Professor WILLIAMS

Courses for Graduates and Advanced Undergraduates

19a-19b. Goethe's Faust.—The Faust legend and early Faust books and plays; the genesis of Goethe's *Faust;* reading of both parts. *Twice a week; both semesters.* Professor BROOKS

26a. German Literature up to 1800.—*Three times a week; first semester.* Professor ARON

26b. German Literature since 1800.—*Three times a week; second semester.* Professor ARON

31. Middle High German.—*Twice a week; first semester.* Associate Professor WILLIAMS

GREEK

(See Classics)

HISTORY

Graduate work in history requires two years of college work in this subject, or sixteen semester hours, which should ordinarily include introductory courses in European and American history. Linguistic preparation is important, especially in French and German. For medieval history some knowledge of Latin is essential, and Spanish is useful for certain fields of American history.

Advanced courses in history at the University of Illinois are of three kinds: (1) Courses for information and guidance in general reading. (2) Instruction in methodology, historiography, and bibliography. A part of this work (in course 103) is required of all graduate students in history during their first year. (3) Seminary courses for the study of special fields with a view primarily to training in the methods of historical criticism and research.

Illinois Historical Survey.—Students of history have an opportunity to pursue research in Western history in connection with the Illinois Historical Survey, which is an organization for the purpose of carrying on systematic studies in the history of Illinois.

Attention is also called to the fact that the University of Illinois has for some time cooperated with the Trustees of the State Historical Library in the gathering and editing of archive material. As a result of this relation instructors and graduate students in the department have contributed from time to

time to the publications of the Library and have been given useful training in the study of manuscript as well as of printed material.

Higher Degrees in History.—The following statement regarding the specific requirements for higher degrees in history is subject to the general requirements of the Graduate School.

Master of Arts

In addition to meeting the usual tests in the specific courses taken, each candidate for this degree will ordinarily be required to pass a general written examination early in the year and toward the close of the second semester an examination, also written, in two of the following fields: ancient history; medieval history of continental Europe; modern history of continental Europe; English history; American history; Latin American history. The candidates are expected to have a general knowledge of historical bibliography (see course 103a). The department further requires a working knowledge of one important foreign language, ordinarily French or German.

Doctor of Philosophy

Major Requirements.—A candidate who selects history as his major subject may offer himself for examination in any four of the fields indicated below, stating also the particular field among these four in which he wishes to specialize and in which his thesis is to be written:

1. Ancient history. 2. Medieval history and institutions of continental Europe, to the close of the thirteenth century. 3. Continental Europe from 1300 to 1648. 4. Continental Europe and its dependencies since 1648 (except as included in 5 and 6). 5. The history of England and its dependencies (not including America before 1783). 6. The history of the United States. 7. The history of Latin America. This enumeration of fields is not to be regarded as excluding the possibility of accepting others as may be determined by the department in individual cases.

Minor Subjects.—A candidate for the doctorate in history may select as his first minor one of the divisions of the field of history listed above which is not offered as a part of his major. He should preferably, however, select his minors from subjects offered by other departments. The following list of suitable minors is intended to be suggestive rather than exhaustive or compulsory.

I. In Political Science.—(Any two acceptable for a first minor; any one, for a second minor.) 1. International law and diplomacy. 2. Modern government. 3. Municipal government. 4. Constitutional and administrative law and jurisprudence. 5. Political theory.

II. In Economics and Sociology.—(Any two acceptable for a first minor; any one, for a second minor.) 1. Economic history. 2. Economic theory. 3. Public and private finance. 4. Social reform. 5. Principles of sociology.

III. In Philosophy and Education.—(Any two acceptable for a first minor; any one, for a second minor.) 1. History of ancient and medieval philosophy. 2. History of modern philosophy. 3. History of education.

IV. In Literature.—Some division of the history of literature which may be either comparative literature of a limited period or the literature of a particular country for a more extended period as may be agreed upon in each case.

Courses for Graduates

101. Seminar in American History.—*Two hours, once a week; both semesters. One unit.*

Semester I: Introduction to research in American history.

Professor ROBERTSON

Semester II: Guidance in the investigation of selected topics.

Associate Professor RANDALL

102. Seminar in English History.—A study of selected topics in the early modern period. *Arrange hours; both semesters. One unit.*

Associate Professor DIETZ

103a-103b. Historiography and Historical Method.—103a is required of all candidates for an advanced degree in history who do not present evidence of similar training elsewhere. *Twice a week; both semesters. One-half unit.*

Associate Professors RANDALL, SWAIN

104. Seminar in European History.—*Two hours, once a week; both semesters. One unit.*

Semester I: Travels and Travelers in the Far East.

Semester II: Continental European Diplomacy during the great war.

Professor LYBYER

105. Research in Special Topics.—Guidance in writing theses for advanced degrees. *One to two units.*

Professors LARSON, LYBYER, ROBERTSON, PEASE; Associate Professors JONES, RANDALL, DIETZ, HANSEN, SWAIN, RODKEY, Assistant Professor DUNBAR

106. Seminar in Medieval History.—A study of selected topics in the history of the later middle ages. *Arrange hours; both semesters. One unit.*

Professor LARSON

122. History of the West.—An intensive study of the westward movement, 1760-1816. *Two hours, twice a week; both semesters. One unit.*

Professor PEASE

126. Spain in Europe and America, 1750-1825.—Bibliography, historiography, and topical reports. *Arrange hours; first semester. One unit.*

Professor ROBERTSON

127. Spanish-American Relations.—Relations of the Latin-American nations with the United States. The Monroe Doctrine, intervention, etc. *Arrange hours; second semester. One unit.* Professor ROBERTSON

138. The History of France in the Seventeenth Century.—*Twice a week; both semesters. One unit.* Professor JONES

150. Research in Ancient History.—Problems in the Relations of East and West. *Arrange hours; both semesters. One unit.* Associate Professor SWAIN

Courses for Graduates and Advanced Undergraduates

16a-16b. The American Colonies in the Eighteenth Century and the Beginnings of National Life and Organization.—*Three times a week; both semesters.*

Assistant Professor DUNBAR

17a-17b. Social and Economic Forces in the United States in the Nineteenth Century.—*Three times a week; both semesters.* Associate Professor HANSEN

19a-19b. The History of American Immigration.—*Twice a week; both semesters.* Associate Professor HANSEN

20a-20b. History of the South.—*Twice a week; both semesters.* Associate Professor RANDALL

21. Recent History of the United States.—*Twice a week; first semester.* Professor ROBERTSON

25. The Civil War and the Reconstruction.—*Three times a week; first semester.* Associate Professor RANDALL

26. History of the Latin-American Colonies.—*Three times a week; first semester.* Professor ROBERTSON

27. History of Latin America from the Wars of Independence to the Present Time.—*Three times a week; second semester.* Professor ROBERTSON

29. America and Europe.—A study of the foundations of international intercourse in the later eighteenth and the early nineteenth century with particular reference to the Latin-American colonies and states. *Three times a week; second semester.* Professor ROBERTSON

30a-30b. The Mohammedan World.—*Three times a week; both semesters.* Professor LYBYER

32a-32b. The History of Europe, 1848-1928.—*Three times a week; both semesters.* Professor LYBYER

33a-33b. History of Russia.—*Three times a week; both semesters.* Associate Professor RODKEY

34a-34b. The History of Europe, 1648-1848.—*Three times a week; both semesters.*

36a-36b. The Holy Roman Empire and the Development of Modern Germany.—*Three times a week; both semesters.* Associate Professor RODKEY

37a-37b. History of Eastern, Central and Southern Asia.—*Three times a week; both semesters.* (Not given in 1930-31). Professor LYBYER

38a-38b. Development of the French Monarchy in Early Modern Times, 1285-1648.—*Three times a week; both semesters.* Associate Professor JONES

39a-39b. The Renaissance and the Reformation.—The transition from medieval to modern ideals. *Three times a week; both semesters.* (Not given in 1930-31). Associate Professor JONES

44a-44b. Constitutional History of England.—*Three times a week; both semesters.* Professor LARSON

46a-46b. The Industrial Revolution and English Social Politics, 1750-1928.—*Three times a week; both semesters.* Associate Professor DIETZ

47a-47b.—History of England in the Early Modern Period, 1399-1603.—*Three times a week; both semesters.* (Not given in 1930-31).
Associate Professor DIETZ

52. The Hellenistic Age.—*Three times a week; first semester.*
Associate Professor SWAIN

55. History of Greece.—*Three times a week; first semester.*
Professor OLDFATHER

56. History of Rome.—*Three times a week; second semester.*
Professor OLDFATHER

57. The Roman Empire.—Special attention will be devoted to the organization and administration of the empire, the life in the provinces, the progress of the Oriental Religions, and the relations of the empire to Christianity. *Three times a week; second semester.* Associate Professor SWAIN

60. The United States in the World War.—*Three times a week; second semester.* Associate Professor RANDALL

62a-62b. Constitutional History of the United States.—*Three times a week; both semesters.* Associate Professor RANDALL

HOME ECONOMICS

Students electing graduate courses dealing with food and nutrition will present chemistry, 20 hours (including quantitative and organic); bacteriology, 5 hours; physiology, 5 hours; food and dietetics, 10 hours; nutrition, 2 to 5 hours. For the more general problems involved in 101, students must present food and dietetics, 10 hours; textiles and clothing, 8 hours; chemistry, 12 hours; physiology, 5 hours; principles of economics, 3 hours.

Courses for Graduates

101. Home Economics.—Each member of the class selects a problem for continuous work and report. *Twice a week; both semesters. One unit.*
Professor WARDALL

102. Research in Food and Nutrition.—*Twice a week; both semesters. One-half to three units.* Assistant Professor ————

103. Nutrition Seminar.—Students registering for this course should have a reading knowledge of French or German. *Once a week; both semesters. One-half unit.* Assistant Professor ————

Courses for Graduates and Advanced Undergraduates

20. Infant Nutrition.—*Twice a week; first semester.*
Assistant Professor ————, Miss PLANT

28. Organization and Management of the Household.—*Twice a week; second semester.* Miss MUNGER

31. Clothing.—*Three times a week; second semester.*
Assistant Professor JACOBSEN, Miss WHITLOCK

33. Diet in Disease.—*Three times a week; both semesters.*
Assistant Professor BARTO

35. Experimental Cookery.—*Three times a week; second semester.*
Miss SCHREIBER

39a-39b. Readings in Food and Nutrition.—*Once a week; both semesters.*
Assistant Professor BARTO, Mrs. MEYER, Miss PLANT

41. Problems in Nutrition.—*Three to five times a week; second semester.*
Assistant Professor ————, Miss PLANT

43a-43b. Problems in Textiles and Clothing.—*Three times a week; both semesters.* Assistant Professor JACOBSEN;
Misses WEAVER, WHITLOCK, MCCULLOUGH, BARNES

45. Nutrition Classes.—*Twice a week; second semester.*
Assistant Professor BARTO, Miss KING

48. Institutional Dietaries and Administration.—*Three times a week; second semester.* Assistant Professor SMITH

50. Costume Design.—*Three times a week; second semester.* Miss BARNES

51. Textiles.—*Twice a week; second semester.*
Assistant Professor JACOBSEN

55. Food and Nutrition.—*Five times a week; first semester.*
Assistant Professor ————, Miss PLANT

56. Child Care and Training.—*Twice a week; second semester.*
Assistant Professor WALLS

57a-57b. Problems in Household Management.—*Three times a week; both semesters.* (Not given in 1930-31).

HORTICULTURE

At least twenty hours of collegiate work in horticulture and allied subjects and specific preparation for the chosen topics are required for entrance on major work in this department.

Students desiring to specialize in plant breeding (or animal breeding) are referred to the Zoology Department for the fundamental courses in Genetics.

Courses for Graduates

103. Olericulture.—*Both semesters. One to two units.* Professor LLOYD

108. Pomology.—*Both semesters. One to two units.*
Professors BLAIR, LLOYD, DORSEY, RUTH; Associate Professor ANDERSON

115. Floriculture.—*Both semesters. One to two units.*
Professor DORNER; Associate Professor WEINARD

Courses for Graduates and Advanced Undergraduates

12. Evolution of Horticultural Plants.—*Three times a week; first semester.*
Professor DORSEY

43. Greenhouse Fertilizers.—*Three times a week; first semester.*
Associate Professor WEINARD

44. Pomology Seminar.—For seniors and graduates specializing in pomology. *Once a week; both semesters.* Professor RUTH

45. Plant Nutrition.—*Three times a week; second semester.*
Associate Professor WEINARD

46. Marketing Horticultural Products.—Required inspection trip, expenses about $20. For seniors and graduates specializing in horticulture. *Three times a week; first semester.* Professor LLOYD

47. Fruit Production and Storage.—The effects of environment upon fruit trees and fruits. The storage of fruits. *Three times a week; first semester.*
Professor RUTH

51. Fruit Diseases.—*Three times a week; second semester.*
Associate Professor ANDERSON

LIBRARY SCIENCE

Candidates for the Master's degree in Library Science must have completed at least thirty semester hours' work in Library Science in this institution or in an approved institution.

Students desiring to prepare for work in special types of libraries will be expected to include at least one unit of advanced courses in appropriate subjects other than Library Science. All such changes in the program of the student must be approved by the Director of the Library School.

Courses for Graduates

101. Thesis.—*One to two units.*
Professor WINDSOR; Associate Professor SIMPSON, and others

102. Seminar.—Special topics in library administration and history, and in bibliography. *Once a week; both semesters. One unit.*
Professor WINDSOR; Associate Professor SIMPSON, and others

103. Advanced Reference Problems.—Transactions of societies; government publications; periodicals and indexes. *Twice a week; first semester. One-half unit.* Associate Professor SIMPSON

104. Advanced Cataloging and Classification.—Systems of book classification; comparative rules for cataloging books; bibliographical institutions. *Twice a week; second semester. One-half unit.* Assistant Professor BOND

Courses for Graduates and Advanced Undergraduates

7. History of Libraries.—The foundation, development, and resources of the leading libraries of Europe and the United States. *Twice a week; second semester.* Associate Professor SIMPSON

9. History of Books and Printing.—History of the early forms of books; the invention and spread of printing; the book trade; book-binding. *Twice a week; second semester.* (Not given in 1930-31). Professor WINDSOR

13a. Public Documents.—Publications of the United States government and their use as sources of information. *Twice a week; first semester.* Miss NEWTON

24a-24b. Selection of Books.—Foreign fiction; drama; poetry; special problems in selection. *Twice a week; both semesters.* Miss HOSTETTER

26b. Library Administration.—Library organization; work with children; special topics. An inspection trip to libraries and book-publishing houses, requiring about one week and costing approximately $30. *Three times a week; second semester.* Miss GRAMESLY and others

42. Public Documents.—Publications of American states and municipalities; publications of foreign governments. *Three times a week; second semester.* Miss NEWTON

44. Bookbuying for Large Libraries.—The problems in book purchase which must be met in the order departments of large libraries. *Twice a week; first semester.* Miss GARVER

45. Library Buildings.—The planning of library buildings and the selection of equipment with special emphasis on the administrative aspects. *Twice a week; first semester.* Professor WINDSOR; Miss GRAMESLY

46. High School Library Administration.—*Three times a week; second semester.* Miss HOSTETTER

MATHEMATICS

Students entering on graduate study with a major in mathematics must have had twenty-five hours of undergraduate work in mathematics, including a one-year course in calculus and one advanced course such as a course in theory of equations, or in differential equations. They should be able to read German and French.

Candidates for a doctor's degree taking a first minor in mathematics are expected to have completed a course in calculus and are required to take two one-year courses beyond the calculus; candidates for a doctor's degree taking a second minor are required to complete at least one course throughout a year beyond the calculus.

The courses offered by the department are arranged in cycles of two or of three years, so that a student will have opportunity to take any particular course offered by the department, for which he is qualified, in three years of residence required for the doctor's degree.

Courses for Graduates

100. Seminar.—*Three times a week; both semesters. One to two units.* Professors CARMICHAEL, MILLER, SHAW, EMCH, COBLE; Associate Professors CRATHORNE, HAZLETT; Assistant Professors LYTLE, LEVY, BRAHANA, MARIA. For the master's degree: Dr. STEIMLEY, Dr. BAILEY, Dr. KETCHUM, Dr. BOURGIN, Dr. PEPPER, Dr. HOPKINS, Dr. MILLER, Dr. OGG.

101. Functions of Real Variables.—*Three times a week; both semesters. One unit.* (To be given in 1931-32).

102. Functions of a Complex Variable.—*Three times a week; both semesters. One unit.* Assistant Professor MARIA

110. Elliptic Functions.—*Three times a week; both semesters. One unit.* (To be given in 1932-33). Professor CARMICHAEL

112. Linear Difference Equations.—*Three times a week; both semesters. One unit.* (To be given in 1931-32). Professor CARMICHAEL

113. Linear Differential Equations.—*Three times a week; both semesters. One unit.* Professor CARMICHAEL

122. Modern Algebra.—*Three times a week; both semesters. One unit.* (To be given in 1931-32). Associate Professor HAZLETT

124. The Theory of Numbers.—First semester: Theory of congruences and residues. Second semester: Theory of algebraic numbers. *Three times a week; both semesters.* Associate Professor HAZLETT

126. Theory of Groups.—Introductory course. *Three times a week; both semesters. One unit.* (To be given in 1931-32). Professor MILLER

127. Theory of Groups.—Advanced course. *Three times a week; both semesters. One unit.* Professor MILLER

129. Theory of Statistics.—The mathematical theory underlying statistics with applications to problems in economics, biology, and sociology. *Three times a week; both semesters. One unit.* Associate Professor CRATHORNE

131. Algebraic Geometry.—*Three times a week; both semesters. One unit.* Professor COBLE

132. Analytic Projective Geometry.—*Three times a week; first semester. one unit.* Professor EMCH

133. Geometric Transformations.—*Three times a week; second semester. One unit.* Professor EMCH

135. Differential Geometry.—*Three times a week; both semesters. One unit.* Assistant Professor LEVY

139. Analysis Situs.—*Three times a week; both semesters. One unit.* Assistant Professor BRAHANA

141. Vector Methods.—*Three times a week; both semesters. One unit.* (To be given in 1932-33). Professor SHAW

143. Linear Algebras.—*Three times a week; both semesters. One unit.* Professor SHAW

145. Linear Operations.—*Three times a week; both semesters. One unit.* (To be given in 1931-32). Professor SHAW

Courses for Graduates and Advanced Undergraduates

10. Theory of Equations and Determinants.—*Three times a week; first semester.* Dr. HOPKINS

16-17. Differential Equations and Advanced Calculus.—*Three times a week; both semesters.* Dr. BAILEY, Dr. STEIMLEY, Dr. KETCHUM

18. Constructive and Projective Geometry.—*Three times a week; second semester.* Dr. OGG

21. Theory of Probability.—*Three times a week; second semester.* Associate Professor CRATHORNE

22. Statistics.—May be counted only toward a minor in mathematics. *Three times a week; first semester.* Associate Professor CRATHORNE

30-31. Actuarial Theory.—*Three times a week; both semesters.* (To be given in 1931-32). Associate Professor CRATHORNE

32. History of Mathematics.—*Three times a week; second semester.* Assistant Professor LYTLE

35. Teachers' Course.—May be counted only toward a minor in mathematics. *Three times a week; first semester.* Assistant Professor LYTLE

40. Fundamental Concepts of Mathematics.—*Three times a week; second semester.* (To be given in 1931-32). Assistant Professor LYTLE

52. Differential Equations of Mathematical Physics.—*Three times a week; both semesters.* (To be given in 1932-33). Dr. BOURGIN

53. Integral and Operational Equations in Mathematical Physics.—*Three times a week; both semesters.* Dr. BOURGIN

60. Introduction to the Theory of Numbers.—*Three times a week; second semester.* Dr. PEPPER

91. Introduction to Modern Mathematics.—*Three times a week; both semesters.* Professors COBLE, CARMICHAEL

MECHANICAL ENGINEERING

The prerequisite for graduate work in mechanical engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in mechanical engineering in the branches of the subject in which registration is desired.

Courses for Graduates[1]

107. Thermodynamics and Heat Motors.—*Twice a week; both semesters. One unit.* Professor ————

108. The Flow of Fluids and Heat Transfer.—*Twice a week; either semester. One unit.* Associate Professor MACINTIRE

109. Mechanical Engineering Design.—*Twice a week; either semester. One unit.* Professor LEUTWILER

112. Laboratory Investigations.—*Three times a week; both semesters. One and one-half units.*
Professors WILLARD, KRATZ, POLSON, HAM and Associate Professor MACINTIRE

MECHANICS, THEORETICAL AND APPLIED

The prerequisite for the courses for graduates in theoretical and applied mechanics is the equivalent of the undergraduate courses in theoretical and applied mechanics and in allied engineering subjects required for the degree of Bachelor of Science in engineering.

Courses for Graduates

101. Analytical Mechanics.—*Twice a week; first semester. One unit.* Professor MOORE

102. Resistance of Materials.—*Twice a week; second semester. One unit.* Professor MOORE

103. Hydraulics and Hydraulic Engineering.—*Twice a week; second semester. One unit.* Professor ENGER

104. Experimental Work in Laboratory of Applied Mechanics.—*Twice a week; both semesters. One to two units.*
Professors MOORE, ENGER, and Associate Professor RICHART

105. Experimental and Analytical Work in Reinforced Concrete.—*Twice a week; both semesters. One to two units.* Associate Professor RICHART

106. Theory of Elasticity and Applications to Engineering Problems.—*Three times a week; both semesters. One unit.* Professor WESTERGAARD

[1]Courses offered to Junior and Senior students are open for minor credit to students majoring in other departments.

Courses for Graduates and Advanced Undergraduates[1]

41. Advanced Mechanics of Materials.—*Three times a week; first semester.*
Professor SEELY

42. The Properties of Engineering Materials; Specifications and Inspection.—*Twice a week; second semester.* Professor SEELY

43. Laboratory Work in Hydraulics.—*Twice a week; first semester.*
Professor ENGER

44. Laboratory Work in Testing Materials.—*Three times a week; second semester.* Professor MOORE

45. Advanced Statics.—*Three times a week; first semester.*
Professor WESTERGAARD

46. Advanced Statics.—*Twice a week; second semester.*
Professor WESTERGAARD

METEOROLOGY

(See Geology)

MINERALOGY

(See Geology)

MINING ENGINEERING

The prerequisite for graduate work in mining engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in mining in the branches of the subject in which registration is desired.

In addition to the regular University laboratories, the laboratory connected with the investigation of mining conditions in Illinois now being carried on jointly by the Engineering Experiment Station through the Department of Mining Engineering and the State Geological Survey is available for graduate instruction.

Courses for Graduates

101. Advanced Mining Practice.—*Twice a week; either semester. One unit.*
Professor CALLEN

102. Advanced Preparation of Coal and Ores.—*Twice a week; first semester. One unit.* (Not given in 1930-31).

104.[2] **Mining Reports.**—*Twice a week; either semester. One unit.*
Professor CALLEN

105.[2] **Welfare Work and Education Among Mine Employees.**—*Twice a week; either semester. One unit.* Professor CALLEN

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[1]Other courses offered Senior students are open for minor credit to students majoring in other departments.

[2]Of courses 104 and 105 only one will be given either semester, according to election of students.

106. **Advanced Coal, Ore, and Metallurgical Plant Design.**—*Twice a week; either semester. One unit.* (Not given in 1930-31).

107. **Advanced Non-Ferrous Metallurgical Projects.**—*Twice a week; either semester. One unit.* (Not given in 1930-31).

Courses for Graduates and Advanced Undergraduates

6. **Mechanical Engineering of Mines.**—*Three times a week; second semester.* Professor CALLEN

8. **Mine Administration.**—*Three times a week; first semester.* Mr. MITCHELL

9. **Preparation of Coal and Ores.**—*Three times a week; first semester.* Mr. MITCHELL

16. **Non-Ferrous Ore Treatment.**—The reduction of gold, silver, copper, lead and zinc ores. *Five times a week; second semester.* Mr. MITCHELL

15. **Mine Ventilation.**—*Twice a week; first semester.* Professor CALLEN

20. **Mine Ventilation Laboratory.**—*Twice a week; first semester.* Professor CALLEN

21. **Mine Examination and Valuation.**—*Three times a week; second semester.* Mr. NICHOLSON

41. **Principles of Mining and Metallurgical Design.**—*Three times a week; first semester.* Mr. MITCHELL

42. **Mining and Metallurgical Design.**—*Twice a week; second semester.* Mr. MITCHELL

64. **Mining Laboratory.**—*Three times a week; second semester.* Mr. MITCHELL

PHILOSOPHY

Students who enter on graduate work with philosophy as their major subject must have had a general course in the history of philosophy, a course in logic, and a general course in psychology.

Courses for Graduates

103. **Ethics.**—*Twice a week; first semester. One unit.* Professor DANIELS

105. **Seventeenth Century Continental Thought.**—*Twice a week; second semester. One unit.* Professor DANIELS

106. **English and American Idealism.**—*Twice a week; second semester. One unit.* Professor MORROW

108. **Early Greek Philosophy.**—*Twice a week; first semester. One unit.* Professor MCCLURE

110. Locke, Berkeley, Hume.—*Twice a week; first semester. One unit.*
Professor MORROW

112. German Idealism.—*Twice a week; second semester. One unit.*
Professor MCCLURE

114. Theory of Knowledge.—*Twice a week; first semester. One unit.* (Not given in 1930-31).

116. Types of Logical Theory.—*Twice a week; second semester. One unit.* (Not given in 1930-31).

Courses for Graduates and Advanced Undergraduates

3. History of Ancient and Medieval Philosophy.—*Three times a week; first semester.* Professor MCCLURE

4. History of Modern Philosophy.—*Three times a week; second semester.*
Professor MCCLURE

7. Ethics.—*Three times a week; second semester.* Professor MORROW

9. Political and Social Ethics.—*Three times a week; first semester.*
Professor MORROW

10. Principles and Concepts of Science.—*Three times a week; first semester.* (Not given in 1930-31).

PHYSICS

The prerequisite for graduate work in physics is a college course in general physics with a one-year laboratory course in introductory physical measurements. The student who is to do major work in physics should also have had additional courses in physics or teaching experience, unless the training in his minor subjects, mathematics or chemistry, has been strong and complete. He should also have a knowledge of French and German sufficient to use references in these languages. The courses named below are those open for candidates for the master's or doctor's degree. A large part of the last year's work of the candidate for the doctor's degree is investigational, along either the experimental or the theoretical side of physics. In addition to these major graduate courses, the courses in elementary dynamics, heat, light, electrical measurements, and introductory electrical theory are arranged with certain additions for the graduate credit. The intermediate courses on electricity, magnetism and light (Physics 15, 17) may be offered with certain additions by candidates for the master's degree and then generally only as minors.

Courses for Graduates

104a-104b. Electrical and Magnetic Measurements.—Credit will not be allowed for more than one of courses 15, 44a and 104a. *Two times a week of three hours each; both semesters. Three-fourths or one unit.*
Professor KNIPP; Associate Professor WILLIAMS; Dr. SANDERS

120. **Light.**—Largely physical optics and spectroscopy. Lectures, assigned readings and recitations, with laboratory experiments. *Both semesters. One to two units.* Associate Professor SCHULZ; Assistant Professor PATON

124. **Conduction of Electricity Through Gases.**—*Three times a week; first semester. Three-fourths or one unit.* Professor KNIPP

125. **Architectural Acoustics.**—Theoretical and experimental investigations on the acoustics of buildings. *Twice a week; second semester. One-half unit.* Professor WATSON

126. **Physics Colloquium.**—Attendance is expected of all the graduate students. *Once a week; both semesters. No credit.* Professor LOOMIS

127a-b. **Recent Problems in Physics.**—*Twice a week; both semesters. One-half unit.* (Not given in 1930-31). Professor KUNZ

128. **Some Problems and Methods in Theoretical Physics.**—*Three times a week; first or second semester. One unit.* (Not given in 1930-31).

131. **Investigation of Special Problems.**—*Two to four times a week; both semesters. One to two units.*
Professors LOOMIS, KNIPP, WATSON; Associate Professors SCHULZ, WILLIAMS; Assistant Professor PATON; Dr. SANDERS

132a. **Dynamics.**—*Four times a week; both semesters. One unit.* Professor KUNZ

132b. **Electrodynamics.**—*Four times a week; both semesters. One unit.* (Not given in 1930-31). Professor KUNZ

132c. **Hydrodynamics.**—Especially modern problems in flow and turbulence. *Twice a week; both semesters. One-half unit.* Professor KUNZ

132d. **Electric Oscillations.**—*Twice a week; both semesters. One-half unit.* (Not given in 1930-31). Professor KUNZ

132e. **Thermodynamics and Kinetic Theory of Matter.**—*Three times a week; both semesters. One unit.* (Not given in 1930-31). Professor KUNZ

132f. **Theory of Elasticity.**—*Three times a week; second semester. One unit.* (Not given in 1930-31). Professor KUNZ

133. **Seminar.**—*Three to five times a week; both semesters. One to three units.* Professors in the department

184. **Line Spectra and Atomic Structure.**—*Three times a week; first semester. One unit.* Professor LOOMIS

185. **Band Spectra and Molecular Structure.**—*Three times a week; second semester. One unit.* Professor LOOMIS

186a-186b.—**Quantum Mechanics and Wave Mechanics.**—*Three times a week; both semesters. One unit.* Assistant Professor BARTLETT

190. **Research.**—*Both semesters.* Professors in the department

Courses for Graduates and Advanced Undergraduates

14a-14b. Theoretical Mechanics.—*Three times a week; both semesters.* Dr. SANDERS

15. Electricity and Magnetism.[1]—Recommended to students in non-technical courses who wish a knowledge of electricity and magnetism beyond the course in general physics. Credit will not be allowed for more than one of courses Physics 15, 44a and 104a. *Two recitations or lectures and one three-hour laboratory exercise weekly; second semester.* Dr. SANDERS

16. Heat.—*Three times a week; second semester.*

17. Light.[1]—Recommended to students in non-technical courses. *Two lectures and a three-hour laboratory period weekly; first semester.* Associate Professor SCHULZ

20a-20b. Light.—For advanced students in physics, chemistry, mathematics or engineering. *Twice a week; both semesters.* Assistant Professor PATON

22a-22b. Light Laboratory.—To accompany Physics 20a-b. *Twice a week; both semesters.* Assistant Professor PATON

23. Sound.—*Three times a week; first semester.* Professor WATSON

30. Introduction to Theoretical Electricity.—For advanced students in physics, chemistry, mathematics, and engineering. *Three times a week; second semester.* Associate Professor WILLIAMS

33. Sound Laboratory.—To accompany Physics 23. *One three-hour period a week; first semester.* Professor WATSON

36. Heat Laboratory.—To accompany Physics 16. *One three-hour period a week; second semester.* Dr. ALMY

44a-44b. Electrical and Magnetic Measurements.—Credit will not be allowed for more than one of courses Physics 15, 44a and 104a. *Two three-hour periods a week; both semesters.* Professor KNIPP; Associate Professor WILLIAMS

45. Heat Radiation.—*Three times a week; first semester.* Assistant Professor PATON

46a-46b. Advanced Electrical Measurements.—*Two times a week of three hours each; both semesters.* Associate Professor WILLIAMS

50. Theory and Use of Optometric and Other Optical Instruments.—*Four times a week; first semester.* Associate Professor SCHULZ

78. X-Rays.—*Three times a week; second semester.* Dr. SANDERS

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[1]This course may be taken for a minor credit or as *first* year major credit only.

PHYSIOLOGY

The prerequisites for graduate work in physiology are Physiology 1 or 4, 2 and 6 or equivalent.

Courses for Graduates

101. Journal Club.—Review of literature. *Both semesters. One-fourth unit.*
Associate Professor BURGE

102. Research.—*Both semesters. One to two units.*
Associate Professor BURGE

103. Special Phases of the Physiology of Respiration, Circulation, Digestion, Metabolism, Excretion, Secretion, Glands of Internal Secretion, Nervous System.—*Both semesters. One-half to one unit.* Associate Professor BURGE

Courses for Graduates and Advanced Undergraduates

7. Advanced Mammalian Physiology.—*Three times a week; first semester.*
Associate Professor BURGE

POLITICAL SCIENCE

Graduate work in political science is conducted in the following special fields: (1) political theory; (2) international law and diplomacy; (3) modern government; (4) constitutional law, administrative law, and jurisprudence; (5) municipal administration.

To be admitted to take political science as a major subject, the student must have done at least 18 hours of undergraduate work in political science, economics, and history, not less than nine hours of which have been in political science. To take political science as a minor he must have had at least nine hours' work in these fields, including six hours in political science.

If a student making political science his major is taking both of his minors in other departments, one of them must be in history, economics, or sociology.

Several courses given in other departments are so closely related to those in political science that graduate students whose major is political science may be permitted on petition to take such courses as part of their major work. Attention is called to the courses in public law in the College of Law, the courses in city planning given by the department of horticulture, and the technical courses in municipal and sanitary engineering in the College of Engineering.

Courses for Graduates

101. History of Political Theories.—*Three times a week; first semester. One unit.*
Professor GARNER

102. The Nature of the State.—*Twice a week; second semester. One unit.* (Not given in 1930-31). Professor FAIRLIE

103. Seminar in Political Science and Public Law.—*Once a week; both semesters.*
Members of the department

104. Municipal Administration.—*Twice a week; first semester. One unit.*
Assistant Professor KNEIER

105. The American Constitutional System.—*Twice a week; first semester. One unit.* Professor MATHEWS

106a. Special Topics in International Law.—Research course. *Twice a week; first semester. One unit.* Professor GARNER

106b. Special Topics in International Law.—Research course. *Twice a week; second semester. One unit.* Professor GARNER

107. Foreign Relations of the United States.—*Twice a week; first semester. One unit.* (Not given in 1930-31). Professor MATHEWS

108. Problems of International Organization.—Special problems in the field of international organization, with special attention to the League of Nations. *Twice a week; first semester. One unit.* Associate Professor BERDAHL

112. Public Administration.—Studies in national or local administration in the United States. *Once a week; second semester. One unit.* (Not given in 1930-31).

113. State Government and Administration.—*Twice a week; second semester. One unit.* (Not given in 1930-31). Professor MATHEWS

114. Studies in Political Parties.—*Twice a week; second semester. One unit.* Associate Professor BERDAHL

Courses for Graduates and Advanced Undergraduates

4. Municipal Government.—*Three times a week; first semester.* Assistant Professor KNEIER

5. Constitutional Law of the United States.—*Three times a week; second semester.* Professor MATHEWS

6a. International Law: Law of Peace.—*Three times a week; first semester.* Professor GARNER

6b. International Law: Law of War and Neutrality.—*Three times a week; second semester.* Professor GARNER

7. American Diplomacy.—*Three times a week; first semester.* Professor MATHEWS

8. International Organization.—*Twice a week; second semester.* Associate Professor BERDAHL

9. Principles of Jurisprudence.—*Twice a week; second semester.* Associate Professor FULLER

10. Administrative Law.—*Twice a week; second semester.* (Not given in 1930-31).

11. Constitutional Aspects of Social and Industrial Problems.—*Three times a week; first semester.* Assistant Professor HYNEMAN

12. National Administration in the United States.—*Three times a week; second semester.* Assistant Professor HYNEMAN

13. State Administration in the United States.—*Three times a week; second semester.* (Not given in 1930-31). Professor MATHEWS

14a. Political Parties: Party History and Issues.—*Three times a week; first semester.* (Alternates with Political Science 14b).
Associate Professor BERDAHL

14b. Political Parties: Party Organization and Methods.—*Three times a week; first semester.* (Not given in 1930-31; alternates with Political Science 14a). Associate Professor BERDAHL

17. Judicial Organization and Administration.—*Twice a week; first semester.* (Not given in 1930-31). Professor MATHEWS

18. Legislation in the United States.—*Three times a week; second semester.* (Not given in 1930-31).

21. British Government.—*Twice a week; first semester.*
Associate Professor BERDAHL

22. Continental European Governments.—The political systems of France, Germany, Italy, Switzerland, and Russia. *Three times a week; second semester.*
Professor GARNER

27. Public Opinion.—A study of motives as causal factors in the genesis of political practices. *Three times a week; first semester.* (Not given in 1930-31).

28. Problems of Contemporary Politics.—A survey of factors of major importance in domestic and foreign politics. *Three times a week; second semester.* (Not given in 1930-31).

34. Municipal Problems.—Municipal administration in the United States and Europe. *Three times a week; second semester.* Assistant Professor KNEIER

PSYCHOLOGY

Graduate students who elect psychology as their major subject must have had standard courses, of university grade, both in general psychology and in the psychological laboratory. One general university course is the minimal requirement for graduate students who apply to the department for a minor subject.

102. Translation of Psychological Treatises.—Critical reading of French and German books and articles. *Both semesters. One-half unit.*
Professor WOODROW

103. Research.—Experimental investigations. *Both semesters. One-half to two units.*
Professor WOODROW; Associate Professors CULLER, YOUNG; Assistant Professor HIGGINSON

105. Seminar.—Discussion of current topics in their historical setting, with especial emphasis upon research problems. *Both semesters. One unit.*
Professor WOODROW

106. Neural Theory of the Psychological Functions.—*Second semester. One unit.* Associate Professor CULLER

108. Quantitative Methods.—The logic of research methods in psychology. *First semester. One unit.* Associate Professor CULLER

Courses for Graduates and Advanced Undergraduates

4. Psychological Measurements.—The metric and correlational methods. Laboratory course. *Twice a week; second semester.* Associate Professor CULLER

5. Comparative Psychology.—A systematic survey of animal behavior with particular reference to the behavior of the vertebrates. Laboratory work and discussion. *Three times a week; second semester.* Dr. MCALLISTER

8. Feeling and Emotion.—A critical analysis of the facts, problems, and methods of affective psychology, with special reference to recent psychological studies. *Twice a week; second semester.* Associate Professor YOUNG

11. Learning and Comprehension.—Processes and functions in acquiring new knowledge and skill. *Twice a week; second semester.* Associate Professor CULLER

12-13. Minor Problems (Advanced Laboratory).—Application of methods suitable to new problems in general and comparative psychology. *Three times a week; both semesters.* Professor WOODROW; Assistant Professor HIGGINSON; Dr. SULLIVAN

14. Social Psychology.—Socialization viewed from the standpoint of the group and of the individual member. Socialization of psychological functions. Conflict and adjustment. *Three times a week; second semester.* Dr. SULLIVAN

16. Genetic Psychology.—*Twice a week; first semester.* Dr. SULLIVAN

17. The History of Psychology.—*Three times a week; second semester.* (Not given in 1930-31).

18. Perception.—Perceptual experience; recent revisions of perceptual theory including the doctrine of the *Gestalt.* Lectures and discussions. *Twice a week; first semester.* Associate Professor CULLER

20. Systematic Psychology.—A critical study of contemporary systems: behaviorism, *Gestalt psychologie,* structural, functional and dynamic psychology. For seniors and graduates. *Twice a week; second semester.* Professor WOODROW

30. Attention.—Lectures and discussions. *Twice a week; second semester.* Dr. MÖLLER

34. Individual Differences.—A study of the variation in the mental characteristics of individuals and of groups. For seniors and graduates. *Three times a week; first semester.* Professor WOODROW

RAILWAY ENGINEERING

The prerequisite for graduate work in railway engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in railway engineering in the branch of the subject in which registration is desired.

Courses for Graduates

102. Locomotive Design.—*Once a week; both semesters. One unit.* Professor YOUNG

106. Locomotive Operation.—*Once a week; both semesters. One unit.*
Professor SCHMIDT

110. Railway Location.—*Twice a week; both semesters. One unit.*
Professor KING

Courses for Graduates and Advanced Undergraduates

3. Locomotives.—*Twice a week; first semester.* Mr. SCHRADER

4. Locomotives.—*Three times a week; second semester.* Mr. SCHRADER

31. Railway Yards and Terminals.—*Three times a week; first semester.*
Professor KING

33. Economic Theory of Railway Location.—*Four times a week; second semester.*
Professor KING

62-64. Electric Railway Laboratory and Practice.—*Five times a week; first semester.*
Assistant Professor TUTHILL

70-74. Electric Railway Design and Economics.—*Five times a week; second semester.*
Assistant Professor TUTHILL

ROMANCE LANGUAGES AND LITERATURES

Before entering on the study of Romance languages as a major for the degree of A.M., the candidate must have had at least (a) three years of college work in one Romance language, together with a satisfactory reading knowledge of another; or (b) two years of college work in each of two Romance languages. In either case a reading knowledge of German is highly desirable. Before being accepted as a recognized candidate for the degree of Ph.D., he must have had in addition, satisfactory training in Latin, and must be able to read ordinary German prose. Before entering on the study of Romance languages as a first or second minor, the candidate must have had two years of college work in the language desired.

FRENCH

Courses for Graduates

101. Old French Literature.—*Twice a week; both semesters. One unit.* (Not given in 1930-31).
Professor OLIVER

102. Villon, Rabelais, Montaigne, la Pléiade.—(In French). *Once a week; both semesters. One-half unit.* (Not given in 1930-31).

103. Seventeenth Century Prose Writers.—*Twice a week; both semesters. One unit.*
Professor OLIVER

104. Eighteenth Century Prose Writers.—*Twice a week; both semesters. One unit.* (Not given in 1930-31).
Professor OLIVER

127. French Romanticism.—*Twice a week; both semesters. One unit.*
Professor CARNAHAN

128. Origin and Development of the Novel in France.—*Twice a week; both semesters. One unit.* (Not given in 1930-31). Professor CARNAHAN

129. Special Problems in French Romanticism.—*Once a week; both semesters. One-half to one unit.* Professor CARNAHAN

142. Cours d'Explication Française.—Lecture méthodique et analytique du point de vue de la langue, du style, des idées et des sources de textes illustrant l'histoire de la littérature française. (In French). *Twice a week; both semesters. One unit.*

143. Littérature Française Contemporaine.—Etude des influences sociales, artistiques, philosophiques et scientifiques sur le mouvement littéraire de 1880 environ jusqu'à nos jours. (In French). *Twice a week; both semesters. One unit.*

175. Old French Phonology and Morphology.—*Twice a week; both semesters. One unit.* Professor OLIVER

179. Old Provençal.—*Once a week; both semesters. One-half unit.* (Not given in 1930-31).

195. Seminar.—Research work in preparation for theses in French. *Both semesters. One to two units.* Members of the Department

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of French Literature.—*Three times a week; both semesters.* Professor CARNAHAN, Assistant Professor PALFREY

17a-17b. French Drama of the Nineteenth Century.—*Twice a week; both semesters.* Associate Professor HAMILTON

24a-24b. French Drama of the Seventeenth and Eighteenth Centuries.—*Three times a week; both semesters.* Professor OLIVER

29a-29b. French Lyric Poetry.—*Twice a week; both semesters.* Assistant Professor PALFREY

32a-32b. Le Roman et la Nouvelle au 19ème Siècle.—(In French). *Three times a week; both semesters.* Dr. JACOB

ITALIAN

Courses for Graduates

140. Italian Literature of the Thirteenth and Fourteenth Centuries. Dante, Petrarch, Boccaccio.—*Twice a week. One unit.* (Not given in 1930-31). Associate Professor VAN HORNE

143. Italian Literature of the Fifteenth and Sixteenth Centuries.—*Twice a week. One unit.* (Not given in 1930-31). Associate Professor VAN HORNE

146. Modern Italian Literature.—*Twice a week; both semesters. One unit.* Associate Professor VAN HORNE

195. Seminar.—Research work in preparation for theses in Italian. *Both semesters. One to two units.* Associate Professor VAN HORNE

SPANISH

Courses for Graduates

130. Spanish Literature in the Sixteenth Century.—*Twice a week; both semesters. One unit.* Associate Professor VAN HORNE

131. Spanish Literature in the Seventeenth Century.—*Twice a week; both semesters. One unit.*

134. Spanish Literature in the Eighteenth Century.—*Twice a week; both semesters. One unit.* Associate Professor HAMILTON

135. The Modern Novel in Spain.—*Twice a week; both semesters. One unit.*

138. Spanish-American Literature.—*Twice a week; both semesters. One unit.* (Not given in 1930-31). Associate Professor VAN HORNE

185. Old Spanish.—*Twice a week; both semesters. One unit.* (Not given in 1930-31). Associate Professor HAMILTON

195. Seminar.—Research work in preparation for theses in Spanish. *Both semesters. One to two units.* Members of the Department

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of Spanish Literature.—*Three times a week; both semesters.* Associate Professor HAMILTON

11a-11b. Masterpieces of the Golden Age. Don Quixote, Calderon, Lope de Vega.—*Twice a week; both semesters.* Associate Professor VAN HORNE

17a-17b. Modern Spanish Drama.—*Twice a week; both semesters.*

SOCIOLOGY

Preparation for major graduate work in sociology must include at least the equivalent of twenty-three semester hours in the social and biological sciences, of which at least eight must be in sociology. The remaining fifteen hours may be distributed among economics, philosophy, history, psychology, political science and biology (heredity). A thesis is required of all candidates for the master's and the doctor's degrees. Preparation for graduate work in sociology as a minor requires at least six hours of credit in sociology. Two units will be accepted for a first minor for the master's degree.

Theses subjects may be chosen from any one of the following divisions of the sociological field: general and historical sociology; personality studies; culture theory and culture change; population studies; community studies; social pathology and social adjustment.

Courses for Graduates

100. **Sociological Theory.**—*Twice a week; first semester. One-half to one unit.* Assistant Professor HILLER

102a. **Earlier Developments in Sociology.**—*Twice a week; first semester. One unit.*

102b. **More Recent Developments in Sociology.**—*Twice a week; second semester. One unit.* Assistant Professor HILLER

103. **Development of Culture.**—*Twice a week; first semester. One unit.*

106. **Urban Communities and Urbanization.**—*Twice a week; first semester. One unit.* Dr. TYLOR

107. **Rural Communities.**—*Twice a week; second semester. One unit.* Dr. TYLOR

108. **Research in the Social Effects of Poverty, and Their Prevention and Treatment.**—*Twice a week; first semester. One unit.*

109. **Research in Criminology.**—*Twice a week; second semester. One unit.* Professor TAFT

110. **Population.**—*Twice a week; first semester. One unit.* Professor TAFT

112. **The Sociology of Conflict.**—*Twice a week; second semester. One unit.* Professor TAFT

126. **Educational Sociology.**—*Twice a week; second semester. One unit.* (Not given in 1930-31).

128. **Disorganization and Fusion of Culture Resulting From Immigration.**—*Twice a week; second semester. One unit.* Assistant Professor HILLER

150. **Seminar.**—Preparation of theses. One to two units. Members of the Department

Courses for Graduates and Advanced Undergraduates

I. General Courses

3. **Social Evolution.**—*Three times a week; first or second semester.*

4. **Social Control.**—*Twice a week; first or second semester.* Assistant Professor ALBIG

6. **Urban Sociology.**—*Three times a week; first semester.* Dr. TYLOR

7. **Rural Sociology.**—*Three times a week; second semester.* Dr. TYLOR

II. Specialized Courses

8. **Charities.**—*Three times a week; first or second semester.* Dr. TIMMONS

9. **Criminology.**—*Three times a week; first or second semester.* Professor TAFT

10. Problems of Population.—*Three times a week; second semester.* Assistant Professor HILLER

17. Methods of Sociological Research.—*Three times a week; first semester.* Assistant Professor HILLER

24. Penology.—*Three times a week; second semester.* Professor TAFT

27. Community Organization.—*Twice a week; second semester.* Dr. TIMMONS

28. Immigration and Assimilation.—*Three times a week; first semester.* Assistant Professor HILLER

30. Races of Mankind.—*Three times a week; first or second semester.* Assistant Professor KELLY

40. Ethnology of the American Indians.—*Three times a week; first or second semester.* Assistant Professor KELLY

TRANSPORTATION

Transportation may be taken as a major or minor for the master's degree and as a minor for the doctorate. No student will be admitted to graduate work in transportation unless he has a satisfactory acquaintance with the principles of economics and in addition such knowledge of the general problems of transportation as is represented by the content of the undergraduate course on the transportation system of the United States.

Course for Graduates

100. Economics of Transportation.—*Once a week; both semesters. One unit.* Assistant Professor LOCKLIN

Courses for Graduates and Advanced Undergraduates

3. Industrial Traffic Management.—*Three times a week; second semester.* Assistant Professor LOCKLIN

7. Railroad Finance.—*Three times a week; first semester.* (Given in 1930-31 and in alternate years). Assistant Professor LOCKLIN

8. Railroad Organization.—*Twice a week; first semester.* Mr. ORLAND

10. Railroad Rates.—*Three times a week; second semester.* (Given in 1929-30 and in alternate years). Assistant Professor LOCKLIN

16. Railroad Operation.—*Three times a week; second semester.* Mr. ORLAND

22. Ocean Shipping.—*Three times a week; first semester.* Professor LITMAN

26. Railroad Problems.—*Three times a week; second semester.* Assistant Professor LOCKLIN

ZOOLOGY

At least sixteen semester hours of college work in zoology are required for entering on major graduate study in this subject. Under special circumstances advanced work in closely allied subjects may be accepted in lieu of the fourth semester's work in zoology. When zoology is chosen for a minor the courses listed for graduates and undergraduates must be preceded by at least one full year's undergraduate work in zoology.

For the prosecution of graduate study in zoology a reading knowledge of German and French is indispensable and familiarity with Latin and Greek is of great advantage.

Graduate students specializing in zoology are strongly advised to spend at least one summer in study at the seashore. Every candidate for the doctor's degree will be required to furnish evidence of having completed satisfactorily at least one eight-week period in such work at an approved location. To facilitate this plan an investigator's room has been provided at the Woods Hole Marine Biological Laboratory, where members of the department are offered research facilities without cost to themselves. Application for the use of this room should be made to the head of the department early in the year. Similar facilities are sometimes afforded at other marine laboratories.

Students interested in the field of Genetics are referred especially to courses 115 and 124.

Courses for Graduates

102. Evolution of the Vertebrates.—*Twice a week; first semester. One-half unit.* (Given in 1931-32 and in alternate years). Assistant Professor ADAMS

107. Parasitology.—*Once or twice a week; both semesters. One unit.* (Given in 1930-31 and in alternate years). Professor WARD

109. Physiological Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1930-31 and in alternate years). Professor SHELFORD

110. Economic Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1931-32 and in alternate years). Professor SHELFORD

111. Experimental and Field Ecology.—*Both semesters. One-half to two units.* Professor SHELFORD

115. Factors of Individual and Racial Development.—*Twice a week; both semesters. One unit.* Professor ZELENY

117. Faunistic Zoology.—Taxonomy and distribution, with especial reference to the local fauna. *Three times a week; first semester. One unit. Second semester. One-half to one unit.* Associate Professor VANCLEAVE

127. Theories of Animal Phylogeny.—Relations of various groups of animals; signification of so-called intermediate forms; invertebrate larval forms and theories of descent based on them. *Once or twice a week; both semesters. One unit.* (Given in 1931-32 and in alternate years). Professor WARD

Individual Research Courses

121. Invertebrate Morphology and Parasitology.—*One to two units.*
Professor WARD

122. Vertebrate Morphology.—*One to two units.*
Assistant Professor ADAMS

123. Faunistic and Systematic Zoology.—*One to two units.*
Associate Professor VANCLEAVE

124. Experimental Zoology and Genetics.—*One to two units.*
Professor ZELENY

125. Animal Ecology and Behavior.—*One to two units.*
Professor SHELFORD

126. Embryology and Cytology.—*One to two units.*
Associate Professor SHUMWAY

Courses for Graduates and Advanced Undergraduates

11. Experimental Ecology and Geography.—*Three or four times a week; first semester.*
Professor SHELFORD

17. Field Zoology.—*Three times a week; first semester.*
Associate Professor VANCLEAVE

19. Advanced Ornithology.—*Twice a week; first or second semester.*
Dr. CAHN

20a-20b. Current Investigations.—Must be taken by all graduate students majoring in Zoology. *Once a week; both semesters.* Members of the department

21a-21b. Introduction to Zoological Research.—*Two to five times a week; both semesters.*
Professor WARD

22-23. Morphology of Vertebrates.—*Two to four times a week; both semesters.*
Assistant Professor ADAMS

63-66. Comparative Vertebrate Embryology.—*Two or four times a week; both semesters.*
Associate Professor SHUMWAY

INDEX

Accountancy, 22
Admission, 9
Agronomy, 23
Amount of work for master's degree, 12
Animal Husbandry, 24
Architecture, 26
Astronomy, 26

Bacteriology, 27
Biological laboratories, marine, 12
Board of Trustees, 2
Botany, 28
Business Law, 30
Business Organization and Operation, 30

Calendar, 5, 6
Ceramic Engineering, 31
Changes in study-lists, 10
Character of graduate work, 9
Character of masters' degrees, 12
Chemistry, 32-38
Civil Engineering, 38
Classics, 39
Contents, Table of 3, 4
Credit, transfer of graduate, 12

Dairy Husbandry, 40
Degrees, application for, 13
  Doctor's, 15
  in August, 13
  Masters', 12
  Professional, in Engineering, 14
Deposit, for laboratory material, 21
  for printing thesis, 17
Diploma fee, 20
Doctor's degree, 15
  examination for, 16, 17
  in engineering, 17
  period of study, 16
  residence, 15
  work in other universities, 16
  special regulations, see name of department as Classics, History, etc.

Economics, 42
Education, 45
Electrical Engineering, 47
Engineering, doctor's degree in, 17
  Master's degree in, 14, 15
  Professional degree in, 14
  Architectural, 26
  Ceramic, 31
  Civil, 38
  Electrical, 47
  Mechanical, 66
  Mining, 67
  Railway, 75
English Language and Literature, 48
Entomology, 52
Examinations for doctor's degree, 16, 17
Executive Faculty, 7
Expenses, 20
  board, 21
  room, 21

Faculty, Executive, 7
Failures, 11
Farm Organization and Management, 52
Fees, 20
Fellowships, 18

Final examination for doctor's degree, 16
Foreign language for master's degree, 13
French, 76

Genetics, 53
Geography, 55
Geology, 54
Germanic Languages and Literature, 55
Grades, 14
Graduate Club, 21
Greek, 39, 56

History, 56
  of Graduate School, 9
Home Economics, 60
Horticulture, 61

Incidental fee, 20
Italian, 77

Laboratories, marine biological, 12
Language and Literature, English, 48
  Germanic, 55
  Romance, 76
Language examination for doctor's degree, 16
  foreign, for master's, 13
Latin, 40
Libraries, 19
Library Science, 62
Listeners' courses, 10

Majors, 13, 15
Marine biological laboratories, 12
Master of Arts, degree of, 12
  See also special requirements of various departments, as Economics, Chemistry, etc.
Master of Science, degree of, 12
Master's degree in Engineering, 14
Mathematics, 63
Matriculation fee, 20
Mechanical Engineering, 66
Mechanics, Theoretical and Applied, 66
Medical Science, summer work in, 11
Meteorology, 67
Mineralogy, 67
Mining Engineering, 67
Minors, 13, 15
Miscellaneous courses, 10

Organization of Graduate School, 9

Philosophy, 68
Physics, 69
Physiology, 72
Political Science, 72
Preliminary examinations for doctor's degree, 16
Professional degrees in Engineering, 14
Program of Study, 9
Psychology, 74
Public Speaking, 51

Railway Engineering, 75
Registration, 9
Residence study, 11, 15
Rhetoric, 51
Romance Languages and Literature, 76

Scandinavian Languages, 51
Scholarships, 18
Senior and graduate study, 10
Sociology, 78
Spanish, 78
Staff, students on, 11
Summer study, 11

Theoretical and Applied Mechanics, 66
Thesis, Doctor's, 17
  Master's, 13
  printing doctor's, 17
Thesis work on leave of absence, 14
Transfer of graduate credit, 12
Transportation, 80
Trustees, Board of, 2
Tuition, 20

Undergraduate courses open to graduate students, 10

Visitors, 10

Withdrawal, 11
Work done elsewhere, 12, 14, 16

Zoology, 81

THE GRADUATE SCHOOL

OF THE

UNIVERSITY OF ILLINOIS

Announcements for

1931-1932

PUBLISHED BY THE UNIVERSITY OF ILLINOIS
URBANA

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CONTENTS

	PAGE
Board of Trustees	2
Graduate School Calendar	5, 6
Executive Faculty	7
History and Organization	9
Admission	9
Character of Graduate Work	9
Registration	9
Degrees	11
Master's Degree	11
In Engineering	14
Doctor's Degree	15
Examinations	16
Thesis	16
Scholarships and Fellowships	18
Libraries	18
Fees and Expenses	20
Graduate Club	20

Departments of Instruction

Accountancy	21
Agronomy	22
Animal Husbandry	23
Architecture and Architectural Engineering	25
Astronomy	26
Bacteriology	26
Botany	27
Business Law	29
Business Organization and Operation	29
Ceramic Engineering	30
Chemistry	31
Civil Engineering	36
Classics	37
Greek	37
Latin	38
Dairy Husbandry	39
Economics	40
Education	44
Electrical Engineering	46
English	46
Language and Literature	48
Rhetoric	49
Public Speaking	49
The Scandinavian Languages	49
Entomology	50
Farm Organization and Management	50
Genetics	51

PAGE
Geology ... 51
German ... 54
Greek (See Classics) ... 55
History ... 55
Home Economics ... 58
Horticulture ... 60
Latin (See Classics) ... 38
Library Science ... 61
Mathematics ... 62
Mechanical Engineering ... 64
Mechanics, Theoretical and Applied ... 64
Meteorology (See Geology) ... 65
Mineralogy (See Geology) ... 65
Mining Engineering ... 65
Philosophy ... 66
Physics ... 67
Physiology ... 69
Political Science ... 70
Psychology ... 72
Railway Engineering ... 73
Romance Languages and Literatures ... 74
French ... 74
Italian ... 75
Spanish ... 75
Sociology ... 76
Transportation ... 78
Zoology ... 78
Index ... 81

GRADUATE SCHOOL CALENDAR

SUMMER SESSION

1931	
June 22, Mon.	Registration Day
June 23, Tues.	Instruction begins
July 4, Sat.	A legal holiday
Aug. 8, Sat., 12 m.	Last day for candidates for degrees in August to deposit theses
Aug. 14, 15, Fri., Sat.	Final examinations

FIRST SEMESTER

1931	
Sept. 18, 19, Fri., Sat.	Registration Days
Sept. 21, Mon.	Last day for candidates for the degree of A.M. and M.S. in October to file applications for degrees and to deposit theses
Sept. 23, Wed., 8 a.m.	Instruction begins
Sept. 25, Fri.	Preliminary examination in French
Oct. 2, Fri.	Preliminary examination in German
Nov. 2, Mon.	Last day for candidates for professional engineering degrees to file statements of professional study and experience
Nov. 25, Wed., 11 a.m.	Thanksgiving recess begins
Nov. 30, Mon., 1 p.m.	Instruction resumed
Dec. 22, Tues., 11 a.m.	Holiday recess begins
Dec. 31, Thurs., 5 p.m.	Last day for candidates for professional engineering degrees to submit outlines of theses
1932	
Jan. 4, Mon., 1 p.m.	Holiday recess ends
Jan. 16, Sat., 12 m.	Last day for filing applications for masters' degrees to be conferred in February
	Last day for candidates for the degrees of A.M., M.S. and Ph.D. in February to deposit theses
Jan. 23, Sat.	Preliminary examination in French
Jan. 26, Tues.	Semester examinations begin
Feb. 3, Wed.	Semester examinations end
Feb. 6, Sat.	Preliminary examination in German

SECOND SEMESTER

Feb. 5, 6, Fri., Sat.	Registration days
Feb. 10, Wed., 8 a.m.	Instruction begins
Mar. 1, Tues.	Last day for applications for Scholarships and Fellowships for 1932-1933
Mar. 24, Thurs., 11 a.m.	Easter recess begins
Mar. 29, Tues., 1 p.m.	Easter recess ends
Apr. 29, Fri.	Preliminary examination in French
May 2, Mon.	Last day for candidates for professional engineering degrees to deposit completed theses
	Last day for filing applications for masters' degrees to be conferred in June
May 6, Fri.	Preliminary examination in German
May 16, Mon.	Last day for filing applications for masters' degrees to be conferred in August
May 18, Wed.	Last day for candidates for the degree of Ph.D. in June to deposit theses
May 31, Tues.	Semester examinations begin
June 1, Wed.	Last day for candidates for the degree of A.M. and M.S. in June to deposit theses
June 8, Wed.	Semester examinations end
June 15, Wed.	Sixty-first Annual Commencement

THE EXECUTIVE FACULTY

HARRY WOODBURN CHASE, PH.D., LL.D., PRESIDENT OF THE UNIVERSITY

ARTHUR HILL DANIELS, PH.D., *Professor of Philosophy and Dean of Graduate School*
ROGER ADAMS, PH.D., *Professor of Organic Chemistry*
ERNEST BERNBAUM, PH.D., *Professor of English*
WILLIAM LEONIDAS BURLISON, PH.D., *Professor of Crop Production*
EDWARD HERBERT CAMERON, PH.D., *Professor of Educational Psychology*
ARTHUR BYRON COBLE, PH.D., *Professor of Mathematics*
FREDERICK CHARLES DIETZ, PH.D., *Professor of History*
HERBERT FISHER MOORE, M.M.E., D.Sc., *Research Professor of Engineering Materials*
REXFORD NEWCOMB, A.M., M.ARCH., A.I.A., *Professor of the History of Architecture*
WILLIAM ABBOTT OLDFATHER, PH.D., *Professor of Classics*
HENRY PERLY RUSK, M.S., *Professor of Cattle Husbandry*
RAYMOND STRATTON SMITH, PH.D., *Professor of Soil Physics*
FRED WILBUR TANNER, PH.D., *Professor of Bacteriology*
NATHAN AUSTIN WESTON, PH.D., *Professor of Economics*
ARTHUR CUTTS WILLARD, B.S., *Professor of Heating and Ventilation*

HISTORY AND ORGANIZATION

The University of Illinois offered facilities for advanced study and research in various lines as early as 1872. Organized graduate instruction, however, under the name of the Graduate School, was first undertaken in 1892. In 1894 the administration of the school was vested in the Council of Administration, and the Vice-President of the University became Dean of the School. In 1906 the Graduate School was organized as a separate faculty, consisting of a dean and members of the university faculty assigned to this duty by the President.

By action of the Trustees the teaching faculty of the Graduate School includes all members of the university faculty who give instruction in approved graduate courses. The affairs of the School, however, are in charge of the Executive Faculty appointed each year by the President.

ADMISSION

Admission to the Graduate School may be granted to graduates of institutions whose requirements for the bachelor's degree are substantially equivalent to those of the University of Illinois, and to applicants from other institutions approved by the Executive Faculty, as hereinafter provided. *Admission to the Graduate School does not, however, imply admission to candidacy for an advanced degree, and gives no right or claim to be so admitted. Such candidacy is determined by the faculty after the student has demonstrated by his work here, for from two to five months, that he has the ability to do major work of graduate character. A mere accumulation of "credits" or "grades" is not sufficient.*

Admission to graduate courses may be granted only to those who have had the requisite undergraduate work in those courses or departments. But a student of mature age who satisfies the Dean and the Department concerned of his ability to pursue graduate work in a given line may be enrolled in particular graduate courses, without reference to a degree, and permitted to carry on such study or investigation under the direction of a department of the University as the department shall recommend and the Dean approve.

Application blanks for admission may be secured from the Registrar of the University. Every applicant must submit with his application for admission an official transcript of his college record.

CHARACTER OF GRADUATE WORK

The principal aim of graduate study is the development of the power of independent work and the promotion of the spirit of research. Each candidate for a degree is expected to have a wide knowledge of his subject and of related fields of work; for the graduate student is not expected to get from lecture and laboratory courses all the knowledge and training necessary to meet the requirements for his degree.

REGISTRATION AND PROGRAM OF STUDY

The following regulations concerning registration and program of studies are laid out primarily for first-year students. Second-year and third-year graduate students fill out their programs irrespective of the unit value of courses, according to their needs, under the advice of their instructors.

Registration.—Each graduate student must register at the beginning of each semester. The registration of a new student may be accepted at any time provided the student is prepared to take up courses actually under way. Credit towards the fulfillment of the residence requirement dates, however, from the time of registration and not from the beginning of the semester or year in which the student enters. Registration will not be permitted later in the year than April 1, except in the case of students who expect to continue through the summer session, or are returning to complete a year's work which has been interrupted by unavoidable circumstances. *No student is permitted to attend any university course in which he is not registered.*

A new student must fill out in duplicate an application for admission and submit it to the Registrar, from whom, after the approval of his application, he will receive a card of admission and a study-list which will give details of procedure in registering. He should fill out the study-list after consultation with his adviser, or the person in charge of his major work, and also with the instructors whose courses he wishes to elect. *Registration, including the payment of fees, must be completed by the close of the registration days of the Graduate School. Otherwise a fee of $5.00 for late registration will be charged all former students.*

Changes in Study-Lists.—A graduate student is expected to plan his work so carefully that changes in his study-list during the semester will not be necessary. When a change seems advisable, however, it may be permitted without fee if made within three weeks of the date of registration. After that date a fee of one dollar is charged for each change, except that the total charge for rearrangement authorized on any one change slip shall not exceed two dollars.

Advanced Undergraduate Courses Open to Graduate Students.—

1. *Courses not open to students below senior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as unit courses for graduate credit, or as half-unit courses when listed for less than four hours of undergraduate credit.

2. *Courses open to students of junior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as half-unit courses for graduate credit, or as quarter-unit courses when listed for two to three hours undergraduate credit. Courses to which sophomores are regularly admitted may not be taken for graduate credit, either major or minor.

Seniors and Graduate Study.—If at the beginning of the second semester of his senior year a student who has been in residence at least one year is within five hours of a bachelor's degree, he may be permitted to register for courses which may count for residence for a master's degree, provided his program does not require more than twelve formal class, lecture, or laboratory exercises a week, and is approved by the Dean at the time of registration. Only students of excellent record will be allowed this privilege.

Miscellaneous and Listeners' Courses.—Graduate students are permitted under proper circumstances to attend classes as listeners, and to elect miscellaneous subjects, that is, courses which do not count toward an advanced degree. Listeners' cards may be obtained at the Dean's office. A graduate student in full standing and carrying a minimum program, may be permitted, under proper circumstances, to attend one class as a listener, or to elect one miscellaneous subject (that is, a course which does not count towards an advanced degree). No subject is open as a listener's or miscellaneous course unless it has a specific educational bearing on the student's major or minor subjects of study.

A student who elects a miscellaneous course is required to register in it, do the work, and pass the semester examinations, unless he is permitted to withdraw under the rules. A student who has a listener's card is not permitted to participate in the class work or the examination.

No student may register for a full minimum program of work for graduate credit if it is necessary for him to carry at the same time more than one miscellaneous subject and to visit one course.

Students on the Staff.—Assistants and others on the university staff who undertake to do graduate work are permitted to take an amount of work determined by the terms of their employment. Such a student, if required by his engagements to teach more than five classes a week or to have laboratory work or supervision exceeding ten hours a week, may not receive his master's degree at the end of one year, nor his doctor's degree at the end of three.

Residence and Work Done Elsewhere.—Continuous residence and study are required of all members of the Graduate School, unless they are granted leave of absence by the Dean, upon recommendation of the professor in charge of their work, for the purpose of carrying on elsewhere studies or investigation in the line of work for their degrees.

Graduate Study in the Summer.—Graduate students in the summer session are subject to the same scholastic requirements as those in the regular university year. Their study-lists must be approved by the Dean of the Graduate School, or his representative. Attendance during four out of six consecutive summer sessions, or one semester and two summer sessions, is considered the equivalent of one year in residence. The faculty is unwilling to accept summer-session work beyond the master's degree towards the doctor's degree, except in the case of a student who works in a summer session preceding or following a regular year's attendance at the University. In no case may the last year's work for the doctorate be done in disconnected summer sessions.

No course offered in the summer session may be taken for credit towards a higher degree unless it is described in the summer-session circular as accepted for that purpose.

Summer Work in Medical Sciences.—Graduate courses in medical sciences are offered in the summer quarter between June and September at the College of Medicine of the University of Illinois in Chicago. Circulars describing the courses offered and conditions of admission and work may be obtained from the Secretary of the College of Medicine, Congress and Honore Streets, Chicago.

Failures.—A graduate student who fails in any course in his major subject cannot secure his degree in the same year in which the failure occurred. No condition examinations are given graduate students.

Withdrawal.—If after registration a graduate student wishes to withdraw from any course or to add other work, he must first secure the necessary papers from the Dean's office. See the regulations concerning changes in study-lists, page 10. If he wishes to withdraw from the University he must get clearance papers at the Dean's office.

DEGREES

Masters' Degrees

Character of Masters' Degrees.—The master's degree conferred depends upon the character of the bachelor's degree. The usual practice is that A.M. shall follow A.B.,

and that M.S. shall follow B.S. However, this practice may be departed from in cases where the undergraduate course of study of the candidate was of a kind for which some reputable institutions in this country give A.B., while others give B.S.

Amount of Work Required.—Candidates for the degree of Master of Arts or Master of Science are required to do at least one full year's work in residence, including a thesis. By this is meant from four to five unit courses each semester or their equivalent. A unit course is one which requires ten hours of time a week through one semester, or a minimum of 180 hours, irrespective of the mode of distribution of that time in class work, laboratory work, and private study. Four such courses or their equivalent constitute a full *minimum* program for one semester, and eight such courses, or their equivalent, constitute the *minimum formal* year's work accepted for a master's degree. Only first rate students are permitted to secure a degree with this minimum program.

Unless otherwise permitted, every student must take each semester at least one course open to graduate students only (courses numbered 100 and upwards).

In the first year of his graduate study each student is required to attend a minimum of four formal class, lecture, or laboratory exercises a week. In no case is he permitted during his course to attend more than twelve a week, without permission.

Work Done Elsewhere.—Members of the staff and high-school teachers residing and employed in Urbana or Champaign who have done graduate work in approved institutions elsewhere may secure credit not to exceed four units towards the master's degree by passing examinations in that work. They may complete the work for the degree by securing at least four units more while registered in the Graduate School for not less than one academic year.

Students in zoology who take work in a marine or fresh-water biological laboratory or station are permitted to offer not less than six weeks nor more than nine weeks of such work in partial fulfillment of the requirement for the master's degree.[1] This privilege is granted only when the work is done with the permission of the faculty (secured in advance), in an approved laboratory, and under instructors accepted by the faculty. Credit for such work may be secured by examination after the student has submitted an official certificate of attendance at the laboratory or station, together with a full written report of the work done there. No candidate for the master's degree may avail himself of this provision who is not registered in the Graduate School for one full academic year, during which he shall do the rest of the work necessary for his degree.

Similar arrangements are made, under similar conditions, for students of geology in connection with Geological Surveys.

Majors and Minors.—A candidate for a master's degree may do all his work in one subject, or he may select a major and one minor, or a major and two minors. A major or minor denotes the field of knowledge of a department, or such part thereof as constitutes a separate and independent division of that field. For a master's degree a major is at least half the work, or a minimum of four units, for one year. Less than one unit may not be counted as satisfying the requirements of a minor without the approval of the department concerned.

Foreign Language.—The ability to use one or more of the modern languages ordinarily studied in the undergraduate curriculum is expected of all candidates for

[1]The experience at a marine laboratory which, as indicated above, is optional with the candidate for the master's degree, is required of all candidates for the doctorate in zoology.

the master's degree, and in some lines of study is required. On this matter students should consult the heads of the departments in which their major subjects lie.

Masters' Theses.—Each candidate for a master's degree is required to present a thesis on some subject approved by the professor in charge of his major work. Such approval, except in case of students working for masters' degrees in summer sessions only, must be secured and the subject of the thesis filed at the office of the Graduate School not later than the beginning of the second half year of residence.

Students working for masters' degrees exclusively in summer sessions must announce their thesis subjects not later than the beginning of their third session in residence. The requirement of a thesis may be waived, however, on the recommendation of the professor in charge of his major work and the approval of the Dean, *provided application to waive the thesis is made at the time for announcing thesis subjects.* A student excused from writing a thesis must replace it with additional courses of instruction.

No one will be excused from writing a thesis unless one-half of his program of studies consists of courses numbered 100 and upwards.

The thesis required from a candidate for a master's degree ordinarily will demand one-fourth of the student's time and may not exceed one-third of it. The thesis must be typewritten, on "thesis paper,"[1] and the title page must be printed. The thesis in its final form, together with a certificate of approval by the proper officer, must be left by the professor in charge at the Dean's office at least two weeks before the date on which the degree is to be conferred. No article prepared for another use, or previously published, will be accepted as a thesis.

Applications for Degrees.—Each candidate for the degree of Master of Arts or Master of Science shall file an application for the degree on a blank provided for the purpose, to be had at the Dean's office. For the dates of applications and of deposition of theses, consult the calendar at the beginning of the bulletin.

Degrees in August.—Students who expect to become candidates for the master's degree in August may be recommended at the June meeting of the Senate subject to the successful completion of the work for which they are to register in the summer session. However, in order to avail themselves of this privilege, students must file with the Dean before the June meeting of the Senate an exact statement of the work necessary to complete the requirements for the degree. Blanks for this purpose may be secured at the Dean's office.

Thesis Work on Leave of Absence.—Under proper conditions a student may be permitted to complete the last fourth of his work, if devoted to his thesis, under leave of absence for a period not to exceed the equivalent of two semesters. To get such permission the student must have secured credit for at least six units; must petition for the privilege; must submit to the Dean an outline of the proposed investigation, approved by the professor in charge of his major work, and must submit satisfactory evidence that adequate facilities are available to him at the place where he intends to do the proposed work. Approval on all these points must be obtained one collegiate year before the thesis is due. Immediately following approval the student must register and pay an incidental fee of $20.00.

Grades.—Students' work is graded in five classes, A, B, C, D, and E. The last indicates a failure. D indicates unsatisfactory, though passable work.

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[1]No other will be accepted by the Dean. "Instructions for the Preparation of Theses" may be obtained at the Dean's office.

A student who receives two units of a grade below B during his first year of graduate work may not complete the first year of residence by carrying the minimum program of eight units for the master's degree. Three units of a grade below B disqualify a student as a candidate for a degree.

A failure or absence from examination in any course or failure in any other examination prescribed by the department of the major may prevent the conferring of the degree; and, as already indicated, failure in any course in the major field precludes the conferring of the degree in the same year.

Second Degrees in Engineering

Two classes of second degrees are open to graduates of the College of Engineering, namely, academic and professional.

The academic second degree in engineering is Master of Science, following Bachelor of Science, in architecture, architectural engineering, civil engineering, electrical engineering, etc. This degree is conferred in accordance with the regulations described above for *academic work in residence only.*

The *professional* second degrees in engineering are as follows:

Master of Architecture, after B.S. in architecture.

Architectural Engineer, after B.S. in architectural engineering.

Ceramic Engineer, after B.S. in ceramic engineering.

Civil Engineer, after B.S. in civil engineering or in railway civil engineering.

Electrical Engineer, after B.S. in electrical engineering or in railway electrical engineering.

Mechanical Engineer, after B.S. in mechanical engineering or in railway mechanical engineering.

Engineer of Mines, after B.S. in mining engineering.

Engineer—Physicist, after B.S. in engineering physics.

Professional degrees in engineering may be conferred on two classes of candidates: (1) those who have received an academic degree in engineering from the University of Illinois; (2) those who have received an academic degree in engineering from other institutions of equal standing and who have been members of the teaching or research staff of the College of Engineering or Engineering Experiment Station of the University of Illinois for at least three years prior to the conferring of the professional degree.

A candidate declares his candidacy by filing with the Dean of the College of Engineering, as chairman of the committee in charge, a detailed statement covering his professional engineering experience. This statement must be made upon a standard form supplied by the Dean of the College of Engineering, as chairman of the committee in charge, and must be filed not later than the first Monday in November preceding the commencement at which the candidate expects to receive the degree. No statement of experience will be considered by the committee which does not show that the candidate has had a minimum of four years of acceptable engineering experience after receiving the degree of Bachelor of Science, and that for at least three years he has been in responsible charge of engineering work. Responsible charge in engineering teaching may be considered as responsible charge of work. In determining the acceptability of the engineering experience of the candidate the committee will be guided by the character of his professional work and the degree of responsibility involved, and will take into consideration such evidences of professional ability and growth as may be shown by his investigation of engineering problems, his contributions to technical literature and his membership and activity in engineering societies.

If the professional experience of the candidate is accepted he must submit for approval, prior to December 31, an outline of his proposed thesis. The completed thesis, in the form prescribed in the "Instructions for the Preparation of Masters' and Doctors' Theses," must be deposited with the Dean of the College of Engineering not later than May 1. The candidate must present himself at commencement in order to receive the degree.

A candidate for a professional engineering degree must pay the incidental fee of fifty dollars on being notified that his professional experience is accepted as qualifying him to enter as a candidate for the degree. No one will be enrolled as a candidate for the degree at the following commencement who does not pay his fee at this time. When a candidate for a professional engineering degree has once been accepted and paid his fee, he is eligible to receive the degree at any time within five years, without additional fee, on completion of the requirements; provided, however, that unless he completes the requirements within two years his name will be dropped from the list of candidates and in order to receive the degree within the five-year period he must register once more.

The Degree of Doctor of Philosophy

Major and Minor Subjects.—A member of the Graduate School who desires to become a candidate for the degree of Doctor of Philosophy is required to pursue a major subject in the department in which his research lies. He is also required to choose one minor subject, or he may choose two. If one minor only is chosen it must be taken in a department of study other than that of the major, and credit for it may be earned by work representing not less than four units, or one-sixth of the total residence required for the doctorate. If two minors are chosen, one must be a subject closely related to the major. With the approval of the adviser it may be a division of the major field of study. If the second minor is outside the department of major study, it may be satisfied by work representing not less than two units or one-fourth of a year of residence.

Except by special permission of the Dean the preliminary examination in major and minor subjects may not be taken until the minor work has been done.

Method of Computing Residence.—Credit for a full year of graduate work means that the student has during that time devoted all his working time and energy to study of a graduate grade. After the first year of residence credit is not recorded in units, and there is no fixed correspondence between credit and courses as in undergraduate work. Thus it is possible for a second-year student to devote all his time to one course and his research; and for a third-year student to devote all his time to his research alone.

Period of Study.—The *minimum* period of study required for securing the degree of Doctor of Philosophy is three years, during which the student is required to devote all his working time to his studies. All three years must be spent in resident graduate study at some accredited educational institution and either the first two or the last one of the three must be spent at the University of Illinois. The degree is conferred, however, not for residence during a certain period, but for scholarly attainments and power of investigation, as proved by a thesis and examinations.

Work Done in Other Universities.—Credit for graduate work done in other universities is not "transferred." However, it may be accepted on examination as equivalent to resident work at the University of Illinois, provided the institution in which it was done is of high standing.

EXAMINATIONS

Preliminary.—A. In major and minors.—Towards the end of his second year of study, or by special permission, at the beginning of his third year (not later than the first Saturday in October), the candidate for the degree must submit to a preliminary examination, in order to determine whether he will be accepted as a candidate for the degree in the following year. This examination is intended to test the student's knowledge of the fields of his major and minor subjects of study only. It is partly oral, and may be wholly so.

The student will not be admitted to his preliminary examination until the faculty is satisfied that he has finished substantially the equivalent of two years' graduate work. He must do a full year's graduate work between his preliminary examination and the completion of his work for the doctorate.

B. In Languages.—The candidate will be required to demonstrate his ability to read French and German and other languages needed in his work. This test of proficiency in the use of French and German must be passed before the student is admitted to the preliminary examination in major and minor subjects. For the dates of these language examinations consult the calendar at the beginning of this bulletin.

Application for admission to these examinations must be made a week, at least, in advance of the date of the examination.

Final Examination.—At least two weeks before the time when the degree is conferred, the candidate must submit to a final examination, given by a committee appointed by the Dean. This examination is primarily on the research work of the student, as embodied in his thesis, but it is not confined to that. It extends to the whole field of study of the candidate. It will not be confined to the courses which the candidate has attended in the University of Illinois only, if he has done part of the work elsewhere; nor even to the field covered by the courses specifically taken in this or other universities; but will be so conducted as to determine whether the candidate has a satisfactory grasp of his major subject as a whole, and a general acquaintance with the fields of knowledge represented by his course of study.

The final examination may not be divided. The examination must be taken all at one time even though it requires several sessions.

If after having passed his preliminary examination, he fails in the third year of his study to meet the expectations of the professors in charge of his work, or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

Other Examinations.—Before the candidate is admitted to the final examination and the defense of his thesis, he may be required to take any other examination, oral or written, that is thought proper by the various departments in which he has studied.

The above examinations are in addition to those in the courses for which the student is registered. These must be taken at the time for which they are set in the examination schedule.

THESIS

The power of independent research must be shown by the production of a thesis on some topic connected with the major subject of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or as many of them as may wish to question him about it, in connection with his final examination.

The subject of the thesis should be chosen not later than the end of the second year of residence and must be submitted for formal approval by the faculty not later than six weeks from the beginning of his third year of residence.

A typewritten copy of the complete thesis, *on thesis paper*,[1] and in final form must be deposited in the office of the Dean for presentation to the examining committee not later than two weeks prior to the final examination and not less than four weeks before the time when the degree is conferred. At the same time, the candidate must deposit with the Dean a manuscript of the essential part, or an abstract, or a digest of his thesis, in condition for publication at a cost not to exceed seventy-five dollars ($75). The manuscript must be sufficient to show the method followed, the evidence used and the conclusions reached in the investigation, and must bear the approval of the department and the Executive Faculty of the Graduate School.

The candidate must pay to the Comptroller before graduation the sum of seventy-five dollars ($75) out of which the University will print at least one hundred copies of this manuscript for circulation by the University, unless the thesis entire or in abbreviated form is published by the author or is accepted for publication by a standard journal or publisher within a year from the date of graduation. In the latter event, and after one hundred copies have been presented to the University by the writer, the cash deposit shall be returned to him.

The typewritten and printed forms of the thesis must comply with the regulations given in "Instructions for the Preparation of Masters' and Doctors' Theses," copies of which may be obtained at the Dean's office.

Degree of Doctor of Philosophy in Engineering.—The degree of Doctor of Philosophy in Engineering is offered in certain lines of academic work of a high scholastic type in engineering science for students who wish to prepare themselves as teachers, investigators, and experts.

The general requirements for this degree, as to preliminary education, linquistic attainments, etc., are the same as in other lines.

The following lines of engineering science, or others approved by the Graduate School, may be elected as majors:

Engineering mechanics
Steam engineering
Hydraulic and sanitary engineering
Electrical engineering
Heating and ventilation engineering
Railway engineering
Masonry construction and structural engineering
Coal-mining engineering
Ceramic engineering

The first minor may be any of the above or one of the following sciences or an authorized combination of two of them:

Theoretical mechanics
Mathematics
Thermodynamics
Bacteriology
Chemistry
Geology
Physics (Experimental or mathematical)
Zoology
Botany
Economics

The second minor should be in other than engineering subjects.

[1]No other will be accepted by the Dean.

SCHOLARSHIPS AND FELLOWSHIPS

A number of scholarships and fellowships have been established by the Trustees of the University. To first-year graduate students of ability and promise, there are open a number of scholarships with a stipend of $300 each and freedom from tuition, incidental, and laboratory fees.[1] To second-year and third-year graduate students, that is, those who have had one or two years of graduate study, there are open fellowships with stipends of $400 and $500, with freedom from the above-mentioned fees. The larger stipend is given only to students who are expected to take their degrees within the year. Each holder of a fellowship or scholarship must pay the matriculation fee of ten dollars, unless he holds a first degree from the University of Illinois, and also the diploma fee of ten dollars on receiving his diploma.

Candidates for these scholarships and fellowships must be graduates of the University of Illinois, or of colleges or universities having equivalent requirements for bachelors' degrees.

Application must be made on blanks to be obtained from the Dean of the Graduate School. These application forms should be sent to the Dean of the Graduate School as early as possible in February of the academic year preceding that for which the fellowship is desired. No application will be considered if received later than March first, until after April fifteenth, the date when appointees from the first list of applications must accept or refuse their appointments.

Persons appointed are notified on April first and must send the Secretary of the Board of Trustees notice of their acceptance or refusal by April fifteenth; and must agree that, if accepted, the appointment will not be resigned to take a similar one in any other institution during the year for which it is awarded.

Nominations to fellowships are made on the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself. Scholarships and fellowships are not given to candidates who are over thirty years of age at the time when the appointment is to be made.

For second-year fellowships, adequate preparation in French or German, and for third-year fellowships, adequate preparation in both French and German is required.

An appointment as honorary fellow, without stipend, may be made as specified for paid fellowships in the case of any one who has shown distinguished merit in his work.

The Carr Fellowship in Chemistry.—The Honorable Robert F. Carr, of the class of 1893, gave in 1919 the sum of ten thousand dollars, the income of which is to be used as the stipendium of a fellowship in chemistry or chemical engineering. The stipend is $750.

DuPont Fellowship in Chemistry.—DuPont de Nemours and Company gives the University each year the sum of $750 for a fellowship in chemistry.

LIBRARIES

The general university library, the library of the State Natural History Survey, and that of the State Geological Survey are all at the University in Urbana. The libraries of the School of Pharmacy and the College of Medicine are in Chicago.

These libraries contained on May 1, 1930, about 837,000 volumes, and about 221,800 pamphlets. Of these 793,284 books and 214,000 pamphlets are in the libraries at Urbana; the rest are in Chicago. The library at Urbana also contains 2,997 maps

[1]Up to a certain amount.

and 8,365 pieces of sheet music. The departments at Urbana currently receive about 6,000 serials, while the College of Medicine and School of Pharmacy in Chicago receive 250.

The general library of the University is open daily, from 8 a. m. until 10 p. m. and on Sunday from 2:30 p. m. until 5:30 p. m.

A number of departmental and college libraries and reading rooms are maintained in the library and in other buildings on the campus; these libraries do not necessarily contain all the books in the respective subjects. In some instances they are primarily for the use of the graduate students and advanced undergraduate students in the departments using the respective buildings. The principal departmental libraries and reading rooms are the following:

Name of Library	*Location*	*Estimated number of volumes*
Philosophy, Psychology, and Education	Library Building	3,450
Classics	Library Building	15,000
Modern Languages	Library Building	8,200
English	Library Building	8,300
History and Political Science	Library Building	20,100
Economics, Sociology, and Commerce Reading Room	Library Building	3,500
Natural History	Natural History Hall	27,300
Law	Law Building	38,400
Architecture, Ricker Library of	Architecture Building	8,700
Agriculture Reading Room	New Agriculture Building	22,900
Chemistry	Chemistry Building	13,000
Physics	Physics Building	1,600
Mathematics	Mathematics Building	10,400
Engineering	Engineering Hall	26,400

The Dittenberger Classical Library.—The University possesses the library of Wilhelm Dittenberger, at one time Professor of Classical Philology in the University of Halle. This library contains 5,600 items. It includes the works of the poets and prose writers, numerous works on grammar and history of literature, and between four and five thousand dissertations and programs on special topics. There are also many works dealing with other departments of classical philology, as epigraphy, history of ancient peoples, archeology, philosophy, history of art, geography, chronology, metrics, etc.

The Heyne Library of Germanics.—The library of Professor Moritz Heyne of the University of Göttingen was bought by the University. It contains about 5,200 volumes. The collection is rich in the general field of German philology and in lexicography. It has many rare first editions of works of German literature from the sixteenth, seventeenth, and eighteenth centuries and has sets of a number of rare periodicals.

The Gröber Library in Romance Languages.—The University also possesses the library of Professor Gröber of the University of Strassburg. This library contains about 6,500 titles.

The Vahlen Library, of the late Johannes Vahlen, contains about 10,000 volumes and is in itself an excellent working library in classical philological literature. It is well supplied with texts of Greek and Latin authors.

The Aron Library, collected by the late teacher and student of pedagogy, R. Aron, contains about 20,000 volumes. It is a scholarly collection of educational documents, among them many original and early editions, and furnishes first-hand material for the study of educational movements in Europe, especially in Germany, from the time of Luther and Comenius to the present. The collection of German "Fibeln" or school readers is unique, and the material for the history of juvenile songs and literature, the set of 17th and 18th century atlases, and the collection of rare hymn books and juvenilia make the collection very useful to students of education.

The Cavagna Library.—The library of the late Count Antonio Cavagna Sanigiuliani di Gualdana has been bought by the University. It is estimated that the library contains about 40,000 volumes, besides many maps, manuscripts, and prints, making a notable collection for the study of Italian history, literature, and art.

FEES AND EXPENSES

Except as noted below, graduate students pay fees as follows:

Matriculation fee	$10.00
Incidental fee, each semester, for residents of Illinois	35.00
All students, not residents of Illinois, pay each semester an incidental fee of	62.50
Incidental fee for students registered for thesis work towards the master's degree on leave of absence	20.00
Diploma fee	10.00
For late registration	5.00
For change in study-list	1.00

All graduate students who have not matriculated as undergraduates at the University of Illinois pay the matriculation fee on entrance.

All graduate students pay the diploma fee.

No tuition or incidental fee is charged for graduate courses to scholars, fellows, or members of the corps of instruction or the staffs of the University libraries or of the scientific bureaus or experiment stations, who are appointed by the Board of Trustees, nor for undergraduate courses on their study-lists if approved by the heads of the departments and by the Dean of the School as necessary or desirable for the proper completion of the work for the degree. Otherwise graduate students who take undergraduate courses must pay the proper undergraduate fee.

Each student working in the laboratories, or in the drafting or engineering classes, is required to pay a fee of from 50 cents to $15.00 in each course for chemicals and apparatus used, and for any breakage or damage. But no charges or deposits for laboratory materials are required from scholars, fellows, or members of the corps of instruction or scientific staffs mentioned above, except when breakage or consumption of materials exceeds a certain allowance.

Table board may be obtained at prices ranging from $7 a week.

Room rent, single room, ranges from $20 a month; double room, $12.50 a month, each person.

THE GRADUATE CLUB

The Graduate Club is an unofficial organization of the graduate students and faculty. Its purpose is to furnish an opportunity for those working in different departments to become acquainted with one another and thus counteract the tendency toward narrowness which intense specialization may sometimes induce.

DEPARTMENTS OF INSTRUCTION

Courses open to graduate students are of two classes. The first class is wholly of graduate grade, and the courses are numbered 100 upwards. The second class includes the courses classified as for graduates and advanced undergraduates. These carry numbers below 100. The courses numbered 100 and upwards are all accepted for major credit. Those of the other group are in many cases accepted for minor credit only. This is especially true of courses which are open to juniors.

All courses have certain prerequisites for admission. Inasmuch as the prerequisite preparation may be gained at other institutions from courses differing from those offering a similar preparation at the University of Illinois, so that a statement of prerequisites as given here would not be understood elsewhere, their description is omitted altogether. However, a student who wishes to enter a particular course must satisfy the department concerned that he has had in some form the prerequisites for admission to the course.

For the convenience of first-year students the credit value of graduate courses is given in units. These values have no significance for second-year and third-year students.

The credit received for "courses for graduates and advanced undergraduates" is in accordance with the regulations of the Graduate School (see page 10).

Students are admitted to graduate standing in agriculture who have had a thorough training in the sciences underlying agriculture, and who are otherwise eligible to the Graduate School, even though their undergraduate course of study lacked to some extent the amount and kind of technical work in agriculture included in the course of study for the bachelor's degree in agriculture at the University of Illinois.

ACCOUNTANCY

A student may major in accountancy for the master's degree only. The courses may be taken for minor credit by applicants for the master's or doctor's degree in other departments with the approval of the adviser. The courses in accountancy for graduates only may be selected by those who have had approximately 15 university credits in accountancy, including Accountancy 3a or its equivalent. Accountancy 4a is a prerequisite for 104; 3b for 110; 13 for 113; and 20 for 120.

The courses for graduates and advanced undergraduates may be taken by those who have had the equivalent of 12 university credits in accountancy.

Courses for Graduates

103. Advanced Theory and History.—*Twice a week; both semesters. One unit.*
Associate Professor LITTLETON

104. Accounting Systems.—*Twice a week; both semesters. One unit.*
Professor SCOVILL

113. Governmental Accounting.—*Twice a week; second semester. One unit.*
Professor MOREY

120. Income Tax Development.—*Twice a week; first semester. One unit.*
Professor FILBEY

129. Thesis.—*Once a week; both semesters. One unit.*
Associate Professor LITTLETON and members of the staff

Courses for Graduates and Advanced Undergraduates

3a. Advanced Accounting.—*Three times a week; either semester.*
Professor FILBEY

3b. Auditing.—*Three times a week; either semester.*
Professors FILBEY, SCOVILL, Associate Professor LITTLETON

4a. Cost Accounting.—*Twice a week; either semester.*
Associate Professor SCHLATTER

4b. Accounting Systems.—*Twice a week; either semester.*
Assistant Professor BAILY

5a-5b. C.P.A. Problems.—*Three times a week; both semesters.* Professor SCOVILL

13. Governmental Accounting.—*Twice a week; either semester.*
Professor MOREY, Assistant Professor BAILY

20. Income Tax Procedure.—*Twice a week; second semester.* Professor FILBEY

30. Budgets and Accounting Control.—*Three times a week; either semester.*
Assistant Professor THEISS

AGRONOMY

Graduate students may take work in agronomy leading to the M.S. and Ph.D. degrees. They may specialize for either degree in soil fertility, soil physics, soil biology, plant breeding, or crop production.

For either degree, if two minors are chosen, the first should be, and both first and second may be, taken in a department other than agronomy. If only one minor is chosen, it must be in a field outside of the department.

A candidate for the master's degree in agronomy must present an acceptable thesis, and show proficiency in his work as demonstrated by suitable examinations, prescribed by the department.

Fifteen college credits in agronomy and related subjects are prerequisites for a minor, and five additional credits are prerequisites for a major. Students must have had the fundamental work in science, prerequisite to the major and minor fields of study. Those with unusually good training in science may be permitted by the department to waive certain of the above mentioned requirements.

Courses for Graduates

101. Soil Investigation.—*Twice a week; first semester. One unit.*
Professor DETURK

104. Seminar in Agronomy.—*Once a week; both semesters. One-fourth unit.*
Heads of Divisions

111. Soil Biology.—*Once a week; first semester. One-half to one unit.*
Professor DETURK

112. Plant Breeding.—*Twice a week; first semester. One unit.*
Professor WOODWORTH

114. Crop Production.—*Twice a week; second semester. One unit.*
Professor BURLISON, Associate Professor DUNGAN

118. Investigation.—A special problem is chosen by each student. Graduate students taking a thesis should so indicate in registering in Agronomy 118. *Both semesters. One-half to four units.*
Professors BURLISON, DETURK, R. S. SMITH, WOODWORTH, Associate Professor DUNGAN

119. Experiment Station Problems.—See Animal Husbandry 103.
Professor MUMFORD

Courses for Graduates and Advanced Undergraduates

7. Farm Crops.—*Three times a week; second semester.*
Professor BURLISON, Associate Professor DUNGAN

10. Soil Physics.—*Three times a week; second semester.* Professor R. S. SMITH

11. Soil Biology.—Lectures, laboratory, assigned reading. *Three times a week; second semester.* Associate Professor SEARS

13. Soil Fertility.—Lectures, laboratory, assigned reading. *Three times a week; first semester.* Professor DETURK

22. Plant Breeding.—*Three times a week; first semester.*
Professor WOODWORTH, Mr. MUMM

29. Field Plot Technic.—*Three times a week; second semester.*
Professor WOODWORTH

ANIMAL HUSBANDRY

The department of animal husbandry offers graduate work leading to the degree of Master of Science and the degree of Doctor of Philosophy. For a major or minor for the master's degree the student may specialize in the general field of animal production, or in the special fields of animal genetics, animal nutrition, animal pathology and poultry husbandry. For a major or minor for the doctor's degree he may specialize in animal genetics, the economics of meat production, animal nutrition, and animal pathology. Advanced work in poultry husbandry may be taken for a minor for the doctor's degree.

For registration for a minor in animal husbandry a student must offer at least 15 college credits in the field, including the principles of feeding, the principles of genetics, livestock production and livestock judging, and he must have had an introductory course in organic chemistry. For a major a student must offer at least 5 additional college credits in animal husbandry or in courses related to the major field of specialization. Besides these general requirements, a student must have had the special training required for effective graduate study in the field of his chosen major: For work in animal production, the economics of meat production; for work in poultry husbandry, an introductory course in farm management; for work in animal genetics, at least an introductory course in general zoology; for work in animal nutrition, a satisfactory course in quantitative chemical analysis, and preferably also a course in animal physiology; for work in animal pathology, training in histology, physiology, bacteriology, and hygiene. Attention is also directed to the advisability of

including in undergraduate preparation for graduate work in any phase of animal husbandry at least introductory training in French or German and in mathematics.

In the case of students with an unusually thorough training in science who wish to pursue graduate work in some special field of animal husbandry from a non-agricultural viewpoint, the department may waive certain of the above requirements.

Students who desire to become candidates for the doctorate and who register for a minor in the general fields of animal production or the economics of meat production must take Animal Husbandry 7 and 41, if they have not taken these courses or their equivalents during their undergraduate training. Such students registering for a major in these general fields must take in addition Animal Husbandry 31, and most students so majoring will find it desirable to register in Animal Husbandry 35.

Courses for Graduates

103. Experiment Station Problems.—Organization and administration of research; objects, methods, and the sources of error in experimental work. Open to graduate students in all the departments of the College of Agriculture. *Once a week; second semester. One-half unit.* Professor MUMFORD

112. Research.—Investigations along the following lines:

(a) Economic factors involved in meat production.
Professor RUSK, Associate Professor CARROLL

(b) Systems of livestock farming. Associate Professor CASE

(d) Animal nutrition. The chemistry of feeding stuffs; metabolism experiments and biochemical studies connected with the nutrition of farm animals. Professor MITCHELL

(e) Animal genetics. Individual research course.
Associate Professor ROBERTS

(f) Problems in poultry husbandry. Professor CARD

(g) Animal pathology. Individual research. Professor GRAHAM

One to three times a week; both semesters. One-half to two units. These courses may be taken during the summer by special permission.

117. Animal Genetics.—*Two to three times a week; both semesters. One unit.* Associate Professor ROBERTS

118. Animal Nutrition Seminar.—A review of current literature in animal nutrition. *Two hours a week; both semesters. One-half unit.* Professor MITCHELL

119. Laboratory Methods in Animal Nutrition.—*Two to five times a week; both semesters. One-half to one unit.* Professor MITCHELL

120. Laboratory Methods in the Diagnosis of Animal Diseases.—*Two to five times a week; both semesters. One-half to one unit.* Professor GRAHAM

121. Laboratory Methods in Animal Genetics.—*Two to five times a week; both semesters. One-half to one unit.* Associate Professor ROBERTS

Courses for Graduates and Advanced Undergraduates

7. Principles of Animal Nutrition.—*Five times a week; first semester.* Mr. HAMILTON

22. Advanced Stock Judging.—*Five times a week; first semester.*
Members of the department

24. Meat.—*Once a week; first semester.* Associate Professor BULL

25. Beef Production.—*Three times a week; first semester.*
Professor RUSK, Associate Professor SNAPP

26. Pork Production.—*Three times a week; first semester.* Professor CARROLL

27. Sheep Husbandry.—*Twice a week; second semester.*
Assistant Professor KAMMLADE

28. History of Breeds of Live Stock.—*Three times a week; second semester.*
Professor EDMONDS and other members of the department

29. Systems of Live Stock Farming.—*Twice a week; second semester.*
Associate Professor WILCOX

31. Advanced Course in Animal Nutrition.—*Three times a week; second semester.*
Professor MITCHELL

32. Marketing Live Stock.—The class will visit a terminal live stock market; estimated cost of the trip, $18. *Twice a week; second semester.*
Associate Professor ASHBY

33. Horse Production.—*Three times a week; second semester.*
Professor EDMONDS, Mr. CRAWFORD

35. Animal Hygiene and Sanitation.—*Twice a week; second semester.*
Professor GRAHAM

39. Poultry Production.—*Three times a week; second semester.* Professor CARD

40. Economics of Poultry Keeping.—*Three times a week; first semester.*
Professor CARD

41. Animal Genetics.—*Three times a week; second semester.*
Associate Professor ROBERTS

ARCHITECTURE AND ARCHITECTURAL ENGINEERING

The prerequisite for graduate work in architecture and architectural engineering is the equivalent of the undergraduate courses required at the University of Illinois for the degree of Bachelor of Science in architecture and architectural engineering in the branches of the subjects in which registration is desired.

Courses for Graduates

101. Architectural Construction.—*Twice a week; both semesters. One-half to one unit.* Professors PROVINE, PALMER

103. Advanced Architectural Graphics.—*Twice a week; both semesters. One to two units.* Professors PROVINE, PALMER

104. Architectural Design.—*Twice a week; both semesters. One to four units.*
Professor DEAM

105. Architectural Practice.—*Twice a week; first semester. One-fourth to one-half unit.* Professor PROVINE

106. Architectural History.—Special research. *Twice a week; both semesters. Time to be arranged. One-half to two units.* Professor NEWCOMB

ASTRONOMY

The prerequisites for graduate study in astronomy are mathematics through calculus, a year's course in observational astronomy, and a course in college physics.

Courses for Graduates

101. Seminar.—*Three times a week; both semesters. One unit.* Professor BAKER

103. Celestial Mechanics.—*Three times a week; both semesters. One unit.* Professor BAKER

Courses for Graduates and Advanced Undergraduates

9. Astrophysics.—*Three times a week; first semester.* Professor BAKER

14. Observational Astronomy.—*Three times a week; both semesters.* Professor BAKER

15. Geodetic Astronomy.—*Three times a week; second semester.* Professor BAKER

BACTERIOLOGY

Students electing bacteriology as a major study must have had at least 10 semester hours of bacteriology and 15 semester hours of some other physical or biological science. Before receiving a degree a student must have had work equivalent to courses 5a, 5b, or 20, 8, 26, 103, and 107; candidates for the doctor's degree will be held responsible for a general knowledge of the subject as applied to plant pathology, dairy husbandry (dairy bacteriology), and soil biology. Courses in these subjects are listed under their respective departments and will be counted, after conference with adviser, toward the requirements for the doctor's degree.

Candidates for the doctor's degree with a major study in some other field than bacteriology, who elect a first or second minor in bacteriology, must offer a minimum of three units for the first minor and two and one-half units for the second minor selected from the courses offered in this department, or, for satisfactory reasons, certain courses in the departments mentioned above. Some of these courses must be strictly graduate courses. Course 103 is required of candidates for the doctor's degree whether bacteriology is a major or minor study.

Courses for Graduates

103. Physiology of Bacteria.—*Twice a week; first semester. One unit.* Professor TANNER

107. Research.—For those students who are taking a major in bacteriology either for the doctor's degree or master's degree. *Both semesters. One-half to four units.* Professor TANNER, Dr. WALLACE

118a-118b. Current Literature.—Required of all graduate students majoring in bacteriology. *Once a week; both semesters. One-fourth unit.* Professor TANNER

The attention of students is called also to courses in bacteriology offered in other departments. Certain of these courses must be elected toward requirements for advanced degrees after conference with adviser.

Courses for Graduates and Advanced Undergraduates

8. Applied Bacteriology.—Water, sewage, and food bacteria. *Five times a week; second semester.* Professor TANNER and assistant

10. Epidemiology.—*Twice a week; first semester.* Dr. WALLACE

20. General Bacteriology.—For seniors and graduate students. *Five times a week; both semesters.* Professor TANNER, Dr. WALLACE

26. Pathological Bacteriology.—*Three times a week; first semester.* Dr. WALLACE

BOTANY

Candidates for advanced degrees in botany must offer for admission at least 20 hours in botany, or 15 hours in botany and 5 hours in a related subject acceptable to the department. Graduate students who desire to elect botany for minor credit must offer 15 hours of botany or 10 hours of botany and 5 hours in a related subject acceptable to the department.

The department wishes to call the attention of graduate students to courses in agronomy and soils, bacteriology, chemistry, entomology, geography, geology, horticulture, mathematics, physics, physiology, and zoology which are available to advanced students and offer a broad foundation for the different phases of botanical work. The practical work in plant sciences in the College of Agriculture and the Experiment Station offers unusual facilities to the graduate student. Joint majors may be arranged in botany and agronomy.

Courses for Graduates

110. Botanical Discussions.—Required of all students and of members of the instructional staff. *Once a week; both semesters.* No credit.

112. Discussions in Plant Morphology.—*Once a week; both semesters. One-fourth unit.* Professor BUCHHOLZ

113. Discussions in Physiology.—*Once a week; both semesters. One-fourth unit.* Professor HOTTES

117. Discussions in Pathology and Mycology.—*Once a week; both semesters. One-fourth unit.* Professor STEVENS

118. Discussions in Plant Ecology and Plant Geography.—*Once a week; both semesters. One-fourth unit.* Associate Professor VESTAL

Research Courses

120. Comparative Morphology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 112 to be taken concurrently.) Professor BUCHHOLZ

122. Experimental Morphology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 112 to be taken concurrently.) Professor BUCHHOLZ

130. Physiology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 113 to be taken concurrently.) Professor HOTTES

155. Plant Geography.—*Once or twice a week; both semesters. One-half to two units.* (Botany 118 to be taken concurrently.) Associate Professor VESTAL

170. Pathology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor STEVENS

177. Mycology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor STEVENS

180. Ecology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 118 to be taken concurrently.) Associate Professor VESTAL

Courses for Graduates and Advanced Undergraduates

20. Cytology.—*Once or twice a week; second semester.* (Given in 1931-32 and in alternate years.) Professor BUCHHOLZ

33. Physiology.—Discussions and experiments on growth, and the effect of environment on growth. *Once or twice a week; first semester.* Professor HOTTES

34. Physiology.—Discussions and experiments on respiration, and the effects of the environment and food on energy release. *Once or twice a week; second semester.* Professor HOTTES

41. Bryophytes.—Morphology and classification. *Once or twice a week; first semester.* (Given in 1932-33 and in alternate years.) Dr. HAGUE

42. Fungi.—General morphology and taxonomy. *Once or twice a week; second semester.* Professor STEVENS

43. Pteridophytes.—Comparative morphology. *Once or twice a week; first semester.* (Given in 1932-33 and in alternate years.) Professor BUCHHOLZ

44. Spermatophytes.—Comparative morphology. *Once or twice a week; second semester.* (Given in 1932-33 and in alternate years.) Professor BUCHHOLZ

45. Histology, Anatomy and Technique.—*Once or twice a week; first semester.* Professor BUCHHOLZ

46. Heredity and Evolution.—The cell in inheritance, environment, adaptation and evolution. *Once or twice a week; first semester.* (Given in 1931-32 and in alternate years.) Professor BUCHHOLZ

55. Plant Geography of North America.—Regional divisions of North America; climate, soil, topography, vegetation, vegetational history. *Once or twice a week; first semester.* (Given in 1932-33 and in alternate years.) Associate Professor VESTAL

56. Plant Geography of the World.—Regional divisions and vegetation of continents other than North America. *Once or twice a week; first semester.* (Given in 1931-32 and in alternate years.) Associate Professor VESTAL

60. Systematic Botany.—Phylogenetic study of ferns and flowering plants. Relationship of the principal orders and families, rules of taxonomy and the identification of species. *Once or twice a week; first semester.* (Given in 1932-33 and in alternate years.)

70. Taxonomy of Pathogenic Fungi.—Myxomycetes, Bacteria, Phycomycetes and Ascomycetes. *Once or twice a week; first semester.* Professor STEVENS

77. Taxonomy of Pathogenic Fungi.—Basidiomycetes and Fungi Imperfecti. *Once or twice a week; second semester.* Professor STEVENS

79. Methods in Pathology.—A general survey of the special methods used in Plant Pathology. *Once a week; second semester.* (Given in 1932-33 and in alternate years.) Professor STEVENS

80. Ecology.—Analysis of the environmental complex; responses of plants to particular factors. *Once or twice a week; second semester.* (Given in 1932-33 and in alternate years.) Associate Professor VESTAL

88. Ecology.—Plant Communities. The units of vegetation and their composition and changes. *Once or twice a week; second semester.* (Given in 1931-32 and in alternate years.) Associate Professor VESTAL

BUSINESS LAW

Courses for Graduates and Advanced Undergraduates

10. Law of Security Relations and Banking.—*Three times a week; either semester.* Associate Professor DILLAVOU

BUSINESS ORGANIZATION AND OPERATION

Work may be done in the field of business organization and operation for a major or a minor for the M.S. degree, and for a minor for the doctorate. To do major work in this field, the student must have completed an undergraduate curriculum equivalent to that of the college of commerce and business administration. To do minor work, he must have had at least five semester hours' credit in the principles of economics, also Business Organization and Operation 1 and 2 or the equivalent; Business Organization and Operation 1 is a prerequisite for 104.

Courses for Graduates

102. Marketing Policies and Problems.—*Twice a week; both semesters. One unit.* Associate Professor CONVERSE

104. Scientific Management.—The history of the scientific management movement; critical study of the proposed systems. *Twice a week; both semesters. One unit.* Associate Professor ANDERSON

107. Sales Campaigns.—*Twice a week; both semesters. One unit.* Professor RUSSELL

129. Thesis.—*Time to be arranged; both semesters. One unit.* Professor RUSSELL and others

Courses for Graduates and Advanced Undergraduates

3. Retail and Wholesale Store Organization and Operation.—*Three times a week; second semester.* Associate Professor CONVERSE

4. Management in Manufacturing.—*Three times a week; either semester.*
Associate Professor ANDERSON, Mr. MANDEVILLE

7. Salesmanship.—*Twice a week; either semester.* Mr. KLINE

8. Advertising.—*Three times a week; either semester.* Professor RUSSELL

9. Trade and Civic Organizations.—*Twice a week; second semester.* Mr. KLINE

17. Sales Management.—*Twice a week; second semester.* Professor RUSSELL

18. Advertising Campaigns.—*Three times a week; second semester.*
Professor RUSSELL

20. Credits and Collections.—*Three times a week; first semester.*
Associate Professor CONVERSE

22. Marketing Policies and Problems.—*Twice a week; second semester.*
Associate Professor CONVERSE

70. Operation of Public Utilities.—*Three times a week; second semester.*

75. Management of Public Utilities.—*Three times a week; first semester.*
Assistant Professor GRAY

CERAMIC ENGINEERING

Graduate work leading to the degrees of Master of Science and Doctor of Philosophy in chemistry (ceramic chemistry), and Master of Science and Doctor of Philosophy in ceramic engineering are offered by the department. Graduate students who wish to elect ceramic chemistry as their major field of study must have had the equivalent of twenty-five semester hours of chemistry and this must include satisfactory courses in general chemistry, qualitative and quantitative analysis, and either physical or organic chemistry. Such students must also have had at least one year of college physics and training in mathematics which includes calculus.

The prerequisites for graduate work in ceramics or ceramic engineering are the equivalents of the undergraduate courses required for the degrees of Bachelor of Science in ceramics or ceramic engineering according to the branch of the subject in which registration is desired.

Candidates for the degree of Doctor of Philosophy with their major field of study in ceramic chemistry must fulfill the same general requirements in chemistry as candidates in other branches of chemistry.

Courses for Graduates

101. The Chemistry of the Compounds of Silicon.—*Twice a week; both semesters. One unit.* Professor PARMELEE

102. General Technology of the Clay Industries.—*Both semesters. One to two units.* Professors PARMELEE, HURSH, Associate Professor ANDREWS

103. Silicon Chemistry.—Laboratory to supplement Ceramic Engineering 101, which must precede or accompany it. *Second semester. One to two units.*
Professor PARMELEE

104. Technology of Glass.—*Second semester. One to two units.*
Professor PARMELEE

105. Methods of Ceramic Research.—*Once a week; second semester. One unit.*
Professor PARMELEE

106. Research.—Professors PARMELEE, HURSH, Associate Professor ANDREWS

Courses for Graduates and Advanced Undergraduates

5. Ceramic Bodies.—*Five times a week; first semester.* Professor PARMELEE

7. Heavy Clay Products.—*Three times a week; first semester.*
Associate Professor ANDREWS

8. Glass Technology.—*Twice a week; second semester.* Professor PARMELEE

10. Cements.—*Three times a week; second semester.* Associate Professor ANDREWS

11. Drying Clay Products.—*Three times a week; second semester.*
Professor HURSH

14. Glasses and Glazes.—*Three times a week; second semester.*
Professor PARMELEE

16. Enamels.—*Three times a week; first semester.* Associate Professor ANDREWS

18. Ceramic Microscopy.—*Three times a week; first semester.* Mr. THOMPSON

20. Refractory Materials.—*Twice a week; second semester.* Professor HURSH

22. Kilns and the Burning of Clay Products.—*Three times a week; first semester.*
Professor HURSH

23. Dryer and Kiln Design.—*Twice a week; first semester.* Professor HURSH

24. Ceramic Engineering Design.—*Three times a week; second semester.*
Professor HURSH

28. Pyrochemical Problems.—*Twice a week; second semester.*
Associate Professor ANDREWS

CHEMISTRY

Graduate students whose major subject is in some department other than chemistry, before taking graduate work for credit in this department, must have had the equivalent of 15 university credits in chemistry, and the ground covered should include satisfactory work in general chemistry and in qualitative and quantitative analysis and elementary organic chemistry. Such students are advised to make selections from the following courses: Chemistry 40, 41, 42b, 43b, 27, 28b, 36b and 37b, 50a, 15a, 16a and 97b. Courses of a more special nature will not as a rule be accepted for graduate work unless preceded by one of the courses above. Graduate students who are candidates for an advanced degree in chemistry must have had the equivalent of 25 university credits in chemistry properly distributed.

Graduate students whose major subject is in some department other than chemistry and who intend to take a first minor in chemistry or any branch of chemistry toward the Ph.D. degree must include among the courses taken, Chemistry 40 and 41, or must have had the equivalent.

Graduate students who are candidates for the A.M. or M.S. degree in chemistry must include in the courses taken Chemistry 40 and 41 or must have had the equivalent. Graduate students who are candidates for the Ph.D. degree in any branch of chemistry must include among their courses Chemistry 40, 41, 42b and 43b or must have had the equivalent.

Courses for Graduates

INORGANIC CHEMISTRY

101a-101b. Inorganic Chemistry.—The less familiar elements and their relationship in the periodic system. Lectures; recitations. *Twice a week; both semesters. One-half unit.* Professor HOPKINS

102a-102b. Inorganic Chemistry.—(Laboratory.) Inorganic preparations and qualitative analysis of the less familiar elements. To accompany or follow Chemistry 101a-101b. *One to three times a week; both semesters. One-fourth to three-fourths unit.* Professor HOPKINS

105a-105b. Inorganic Chemistry.—(Seminar and Special Topics.) Current literature; special topic for 1931-32: Second semester, Structure of Molecules of Inorganic Compounds (Dr. Bailar). *One, two, or three times a week; both semesters. One-fourth to one unit.* Professor HOPKINS

QUALITATIVE AND QUANTITATIVE ANALYSIS

123a. Qualitative Analysis.—The principles and methods of analytical chemistry; theory of solutions. Lectures; exercises; reports. *Twice a week; first semester. One-half to one unit.* Associate Professor REEDY

124b. Quantitative Analysis.—A modern survey of advanced principles, calculations, experimental methods and applications. Lectures, with or without laboratory. *Twice a week; second semester. One-half to one and one-fourth units.* Associate Professor REEDY

125a-125b. Quantitative Analysis.—(Seminar.) Special topics in analytical chemistry. (Required of all students taking a major or minor in analytical chemistry.) *One to three times a week; both semesters. One-fourth to one unit.* Professor CLARK

126a. Quantitative Analysis.—(Selected topics in quantitative organic chemistry.) Critical survey of methods of analysis for elementary constituents, application of polarimetry, refractometry, microscopy, optical spectroscopy, spectrophotometry and other instrumental methods. Lectures, laboratory work. *Two to five times a week; first semester. One-half to one and one-fourth units with laboratory.* Professor CLARK, Assistant Professor ENGLIS

127a-127b. Modern Applications of Radiation in Chemical and Industrial Problems.—(X-rays, radioactivity.) *Twice a week; both semesters. One-half to one unit.* Professor CLARK

ORGANIC CHEMISTRY

132a. Organic Chemistry.—(First course.) Review of the general reactions in organic chemistry: Problems. *Twice a week; first semester. Three-fourths unit.*
Professor ADAMS

133b. Organic Chemistry.—Optical isomerism; geometric isomerism; tautomerism, etc. *Twice a week; second semester. Three-fourths unit.* Professor ADAMS

134. Organic Chemistry.—(Laboratory.) Advanced preparations are selected to meet the needs of each individual in the course. Microcombustions. *Two to four times a week; both semesters. One-half to one unit.* Professor MARVEL

135a-135b. Organic Chemistry.—(Seminar.) Current literature. (Required of all students majoring in organic chemistry.) *Once a week; both semesters. One-fourth unit.* Professor ADAMS

136a. Organic Chemistry.—Special topics. *Twice a week; first semester. Three-fourths unit.* Associate Professor FUSON

PHYSICAL CHEMISTRY

145a-145b. Physical Chemistry.—(Seminar.) Recent development in physical chemistry. *Twice a week; both semesters. Three-fourths unit.*
Professor RODEBUSH and staff

PHYSIOLOGICAL CHEMISTRY

150b. Physiological Chemistry.—Chemistry of intermediary metabolism. Lectures; discussions; readings. *Twice a week; second semester. Three-fourths unit.*
Professor ROSE

152a-152b. Physiological Chemistry.—Difficult biochemical preparations; analytical methods; chiefly laboratory. *One to five times a week; both semesters. One-half to one unit.* Professor ROSE, Assistant Professor DU VIGNEAUD

155a-155b. Physiological Chemistry.—(Seminar.) Current literature. (Required of all students majoring in physiological chemistry.) *Twice a week; both semesters. Three-fourths unit.* Professor ROSE

INDUSTRIAL CHEMISTRY

160a-160b. Advanced Chemical Technology, and Chemical Engineering.—Recent developments in the chemical industry. Lectures. *Twice a week; both semesters. One-half unit.* Professor KEYES

161a-161b. Chemical Plant Design.—Calculations and layout of equipment for recently developed processes. *Twice a week; both semesters. One-half unit.*
Associate Professor KRASE

SANITARY CHEMISTRY

186a-186b. Sanitary Chemistry.—Special problems and new developments in sanitary chemistry. *Twice a week; both semesters. One-half to one and one-fourth units.* Professor BUSWELL

MISCELLANEOUS

190a-190b. Research.—A thesis is usually required of students taking the master's degree and is always required of students taking the degree of Doctor of Philosophy. *Both semesters.* Work may be taken in the following subjects:

Physical and Electrochemistry—Professors RODEBUSH, CLARK, Associate Professors PHIPPS, REEDY

Inorganic Chemistry—Professor HOPKINS, Associate Professor REEDY, Dr' BAILAR

Analytical Chemistry—Professor CLARK, Associate Professor REEDY, Assistant Professors SMITH, ENGLIS

X-ray Chemistry—Professor CLARK

Food Chemistry—Assistant Professor ENGLIS

Organic Chemistry—Professors ADAMS, MARVEL, Associate Professors SHRINER, FUSON, Dr. BAILAR

Sanitary Chemistry—Professor BUSWELL

Physiological Chemistry—Professor ROSE, Assistant Professor DU VIGNEAUD

Industrial Chemistry—Professor KEYES, Associate Professor KRASE

Ceramic Chemistry—Professor PARMELEE

Phyto-Chemistry—Assistant Professor ENGLIS

Courses for Graduates and Advanced Undergraduates

INORGANIC CHEMISTRY

15a. Inorganic Chemistry.—The common elements; periodic relationship; preparation and application of the common elements and compounds. Lectures; recitations. *Twice a week; first semester.* Dr. BAILAR

16a. Inorganic Chemistry.—(Laboratory.) Preparation of the less easily produced inorganic compounds. *Twice a week; first semester.* Dr. BAILAR

QUALITATIVE AND QUANTITATIVE ANALYSIS

27. Quantitative Analysis.—Special methods and instruments; gas analysis, electrometric titration, colorimetry, and other advanced analyses. *Four times a week; both semesters.* Assistant Professor SMITH

28b. Quantitative Analysis.—(Advanced course.) Analysis of minerals, alloys and special steels. *Six times a week; second semester.* Assistant Professor SMITH

ORGANIC CHEMISTRY

36b. Organic Chemistry.—(Second course.) *Three times a week; second semester.* Professor MARVEL

37b. Organic Chemistry.—(Laboratory.) (Second course.) Organic synthesis. To accompany 36b. *Twice a week; second semester.* Associate Professor FUSON

38a. Qualitative Organic Analysis.—Identification of pure organic compounds and mixtures. *Twice a week; first semester.* Associate Professor SHRINER

PHYSICAL CHEMISTRY

40. Elementary Physical Chemistry.—*Three times a week; both semesters.*
Professor RODEBUSH, Associate Professor PHIPPS

41. Elementary Physical Chemistry.—(Laboratory.) To accompany Chemistry 40. *Once a week; both semesters.*
Professor RODEBUSH, Associate Professor PHIPPS and assistants

42b. Elementary Physical Chemistry.—*Three times a week; second semester.*
Associate Professor PHIPPS

43b. Elementary Physical Chemistry.—(Laboratory.) *Once a week; second semester.*
Associate Professor PHIPPS and assistants

44a-44b. Advanced Physical Chemistry.—Thermodynamics and free energy calculations. Atomic structure. *Twice a week; both semesters.*
Professor RODEBUSH, Associate Professor PHIPPS

49b. Chemistry of Colloids.—(Sanitary Division.) Preparation and properties of colloids. Special apparatus and technique employed in colloid chemistry. *Three times a week; second semester.*
Professor BUSWELL

PHYSIOLOGICAL CHEMISTRY

50a. Physiological Chemistry.—Proteins, fats, and carbohydrates; tissues, digestion, intestinal putrefaction, and feces; quantitative analysis of gastric contents, blood, milk, and urine. Lectures; laboratory. *Five times a week; first semester.*
Professor ROSE, Assistant Professor DU VIGNEAUD and assistants

51b. Problems of Metabolism.—Micro-methods of blood and urine analysis, and their application. Lectures; laboratory. *Three times a week; second semester.*
Assistant Professor DU VIGNEAUD and assistants

INDUSTRIAL CHEMISTRY

60a. Chemical Technology.—The survey of important processes and recent developments in the chemical industry; inspection trip. (Estimated cost of this trip is $30 to $35 per student.) Laboratory. *Four times a week; first semester.*
Dr. SWANN, Mr. HOWARD

61a-61b. Principles of Chemical Engineering.—The application of scientific principles to the unit operations of chemical engineering. Lectures; laboratory. *Four times a week; both semesters.* Associate Professor KRASE, Mr. HOWARD

62a-62b. Principles of Research and Development.—The fundamental methods used in the research and development departments in chemical industry; also economic problems. *Twice a week; both semesters.*
Professor KEYES

67a-67b. Evaporation.—The theory, design and control of commercial evaporative equipment. *Twice a week; both semesters.*
Associate Professor KRASE

68a. Mechanical Separation.—Equipment for the mechanical separation of solids, liquids and gases. Theory and calculations. *Twice a week; first semester.*
Associate Professor KRASE

69b. Flow of Gases and Liquids.—Fundamental theory and application. The design of measuring devices and other equipment. *Twice a week; second semester.*
Associate Professor KRASE

70b. Humidification and Drying.—Calculations and mathematical studies of humidifiers and driers. *Twice a week; second semester.* Mr. Howard

71a. Sampling, Grinding and Mixing.—Fundamental principles involved and mathematical calculations. *Once a week; first semester.* Mr. Howard

72b. Distillation.—Calculations in the operation and design of distillation equipment. *Twice a week; second semester.* Mr. Howard

73a. Metallurgy.—Manufacture of iron and steel. *Three times a week; first semester.* Mr. Howard

74b. Metallurgy and Metallography.—General metallurgy of iron and steel; physical characteristics and microstructure of metals and alloys. Lectures; laboratory. *Three times a week; second semester.* Mr. Howard

SANITARY CHEMISTRY

86a. Chemistry of Sanitation.—Lectures, demonstrations, and field trips covering the field of water purification, sewage treatment, and general sanitation. *Three times a week; first semester.* Professor Buswell

49b. Chemistry of Colloids.—(See physical division.)

MISCELLANEOUS COURSES

92a. Chemical Literature and Reference Work.—*Once a week; first semester.* Dr. Bartow

95a. History of Science with Particular Reference to Chemistry.—Lectures; reading. *Twice a week; first semester.* Dr. Bartow

97b. Food Analysis.—Quantitative organic analysis of food products; alcohols, carbohydrates, fats and oils, cereals, nitrogenous bodies, preservatives, and colors. *Six times a week; second semester.* Assistant Professor Englis

CIVIL ENGINEERING

The prerequisite for graduate work in civil engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in civil engineering in the branches of the subject in which registration is desired.[1]

Courses for Graduates

101. Water Supply.—*Twice a week; first semester. One unit.* Professor Babbitt

102. Sewerage.—*Twice a week; second semester. One unit.* Professor Babbitt

103. Highway Construction.—*Twice a week; first semester. One unit.* Professor Crandell

104. Municipal Engineering.—*Twice a week; second semester. One unit.* Professor Crandell

105. Advanced Reinforced Concrete Theory.—*Twice a week; first semester. One unit.* Professor Cross

[1]Courses offered to junior and senior students are open for minor credit to students majoring in other fields.

106. Reinforced Concrete Structures.—*Twice a week; first semester. One to three units.* Professor CROSS

107. Statically Indeterminate Structures and Secondary Stresses.—*Twice a week; first semester. One unit.* Professor WILSON

108. Bridge Design.—*Twice a week; second semester. One or two units.* Professor CROSS

109. Water Purification and General Sanitation.—*Twice a week; first semester. One unit.* Professor BABBITT

110. Sewage Disposal, Wastes Disposal and General Sanitation.—*Twice a week; second semester. One unit.* Professor BABBITT

112. Masonry Construction and Foundations.—*Twice a week; second semester. One unit.* Professor HUNTINGTON

124. Steel Building Construction.—*Twice a week; first semester. One or two units.* Professor HUNTINGTON

125. Design of Industrial Structures.—*Twice a week; second semester. One unit.* Dean KETCHUM

130. Hydrology.—*Twice a week; first or second semester. One unit.* Associate Professor PICKELS

131. Waterpower.—*Twice a week; second semester. One unit.* Assistant Professor DOLAND

140. Research.—*First or second semester. One-half to two units.* Members of the department

Courses for Graduates and Advanced Undergraduates

63. Statically Indeterminate Structures.—The elastic theory and its applications in statically indeterminate structures. *Three times a week; first semester.* Professor CROSS

64. Statically Indeterminate Structures.—A continuation of course 63. *Three times a week; second semester.* Professor CROSS

See also Mechanics, Theoretical and Applied, and Railway Engineering.

THE CLASSICS

The Degree of Master of Arts in the Classics.—The major may be either Latin or Greek.

The Degree of Doctor of Philosophy in the Classics.—The degree is given in classical philology. Major work may be taken in either Latin or Greek, but whichever language is taken as a major, the other must be taken as a first minor.

GREEK

Preparation for first-year graduate work in Greek must include at least two years of preparatory Greek, two years of college Greek, and two years of college Latin. A reading knowledge of French and German is important for candidates in this subject. The study of history and philosophy is especially recommended.

Courses for Graduates

106a. Greek Drama, Tragedy.—*Twice a week; first semester. One unit.*
Associate Professor PERRY

106b. Greek Drama, Comedy.—*Twice a week; second semester. One unit.*
Associate Professor PERRY

110. Bibliography and Criticism.—(Thesis course; the same as Latin 110.) *Once a week; both semesters. One unit.* Professors OLDFATHER, CANTER, PERRY

Courses for Graduates and Advanced Undergraduates

6. Thucydides and Plato.—*Three times a week; first semester.* Dr. MYLONAS

8. Greek Oratory, Aristotle and Theocritus.—*Three times a week; second semester.* Dr. MYLONAS

14. Greek Composition.—*Once a week; second semester.*
Associate Professor PERRY

LATIN

Preparation for first-year graduate work in Latin must include at least two years of preparatory Latin and four years of college Latin. A reading knowledge of French and German is important. Some acquaintance with Greek is highly desirable, and the study of history and philosophy is especially recommended.

Courses for Graduates

104. Latin Paleography.—*Twice a week; first semester. One unit.*
Professor OLDFATHER

106. Terence.—*Twice a week; second semester. One unit.* Professor OLDFATHER

107. Latin Epigraphy.—*Twice a week; second semester. One unit.*
Professor CANTER

110. Bibliography and Criticism.—(Thesis course; the same as Greek 110.) *Once a week; both semesters. One unit.* Professors OLDFATHER, CANTER, PERRY

115. Latin Elegy.—*Twice a week; first semester. One unit.* Professor CANTER

117. Lucretius.—*Twice a week; second semester. One unit.*
Associate Professor PERRY

Courses for Graduates and Advanced Undergraduates

21. Tacitus (Annales); Juvenal.—*Three times a week; first semester.*
Professor CANTER

22. Martial, Suetonius and Apuleius.—*Three times a week; second semester.*
Professor CANTER

10. Latin Composition.—*Twice a week; second semester.*
Associate Professor PERRY

DAIRY HUSBANDRY

The graduate student may major in dairy husbandry for the degree of Master of Science or Doctor of Philosophy.

Candidates for advanced degrees in dairy husbandry must have had adequate training in collegiate courses in dairy husbandry. In addition, depending upon his field of specialization, the student should have had courses in the following subjects: chemistry, bacteriology, physics, economics, zoology, genetics and mathematics.

For either degree a first minor must be taken outside the department, preferably outside the college. If a second minor is elected it may with proper approval be chosen in the department.

Courses for Graduates

101. Economic Milk Production.—*Twice a week; both semesters. One-half to two units.* Professor FRASER

104. Dairy Bacteriology.—Fermentation in dairy products. *Both semesters. One-half to one unit.* Professor PRUCHA

105. Dairy Manufactures.—*Both semesters. One-half to two units.* Professor RUEHE

106. Dairy Bacteriology.—Research on assigned problems. *Both semesters. One-half to two units.* Professor PRUCHA

107. Dairy Chemistry.—Assigned problems. *Both semesters. One-half to two units.* Assistant Professor OVERMAN

108. Physiology of Lactation.—*Once a week; both semesters. One-half to two units.* Professor GAINES

112. Research.—*Both semesters. One to four units.* Special problems along the following lines:

(a) Dairy Bacteriology. Professor PRUCHA

(b) Dairy Chemistry. Assistant Professor OVERMAN

(c) Dairy Cattle Breeding. Professor YAPP

(d) Dairy Cattle Feeding. Associate Professor NEVENS

(e) Milk Production. Professor GAINES

(f) Dairy Manufactures. Professor RUEHE

NOTE: Graduate students writing a thesis should so indicate in registering in Dairy Husbandry 112.

Courses for Graduates and Advanced Undergraduates

4. Ice-Cream Making.—*Four times a week; first semester.* Assistant Professor TRACY

5. Composition of Dairy Products.—*Three times a week; second semester.* Assistant Professor OVERMAN

7. Creamery Buttermaking and Factory Management.—*Five times a week; second semester.* Professor RUEHE

10. Dairy Bacteriology.—*Three times a week; first semester.* Professor PRUCHA, Assistant Professor BRANNON

14. Milk Condensing.—*Three times a week; second semester.* Assistant Professor TRACY

17. Advanced Study of Dairy Breeds.—*Three times a week; first semester.* Professor YAPP

20. Economic Problems in Dairy Farming.—*Three times a week; first semester.* Professor FRASER

21. Economic Milk Production.—*Three times a week; second semester.* Professor FRASER

25. Advanced Dairy Cattle Feeding.—*Twice a week; first semester.* Associate Professor NEVENS

26. Marketing Dairy Products.—*Twice a week; second semester.* Mr. BROWN

ECONOMICS

Every student entering on major graduate work in economics must have had a course in the principles of the science and also in some special part of the field such as public finance or money and banking. The work must represent at least eight semester hours. He must have had at least one semester's work in English, American or general European history; and at least three hours in political science.

Those who take the subject as a minor must have had a course of at least five semester hours in the principles.

Graduate students who are making economics their major are required during their first year to acquaint themselves with the works of the masters in the science, by taking either course 101 or 103. In the same or subsequent year they are expected to elect the fundamental courses in some other divisions of the field of economics, as indicated by the divisions listed in the Economic Seminar, course 118. One of the minors for the doctor's degree may be taken in a separate division of economics; the other must be taken out of the department, and preferably outside of the College of Commerce.

The following courses may be taken by students in general economics for major or minor credit; all numbered above 100; 4, 10, 11, 13, 14, 15, 17, 24, 25, 29, 30, 41, 42, 43, 44, 51, 52, 55, 61, 71, 72, 81. The following may be taken for minor credit only: 8, 9, 31, 36, 56, 82.

Two units will be accepted for a first minor for the master's degree; and four two- or three-hour graduate courses, or their equivalent in advanced undergraduate courses, for a first minor for the doctor's degree.

Courses in transportation may be included in their programs by students of economics as part of their major; courses in transportation, accountancy, and business organization and operation may be used to satisfy the requirements for the minor. See Business Organization and Operation, and Transportation.

Courses for Graduates

101. Economic Theory.—*Three times a week; both semesters. One unit.* Professor WESTON

102. Theory of Money, Credit and Prices.—*Twice a week; both semesters. One unit.* Assistant Professor WASSERMAN

103. The Distribution of Wealth.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Professor WESTON

104a. Theories and Policies of International Trade.—*Twice a week; first semester. One unit.* Professor LITMAN

104b. Organization of International Trade.—*Twice a week; second semester. One unit.* Professor LITMAN

105. Public Finance.—*Twice a week; both semesters. One unit.* Professor HUNTER

106. International Exchange and the Money Markets.—*Twice a week; second semester. One unit.* Associate Professor WRIGHT

107. The Corporation in Economic Evolution.—*Twice a week; both semesters. One unit.* Assistant Professor WASSERMAN

109. Comparison of the Theory and Practice of the Leading Central and Reserve Banks with Special Reference to England, Germany, France, and the United States.—A comparative study. *Twice a week; first semester. One unit.* Associate Professor WRIGHT

110a. Finance and Investments: Fundamental Principles Applied to Business Units of a Simple Character.—*Twice a week; both semesters. One unit.* Professor ROBINSON

110b. Finance and Investments: Complex Business Units.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Professor ROBINSON

112. Labor Problems.—*Twice a week; both semesters. One unit.* Assistant Professor BERMAN

Arranged in a two-year cycle:

1931-32: *First semester*, Trade Unionism; *second semester*, Labor and the Law.

1932-33: Social aspects of Labor; *both semesters.*

118. Seminar.—Thesis course. (All graduate students writing theses in economics must register in Economics 118; registration for other students is optional.)

(a) **Third Year:** Seminar. Professor WESTON

(b) **First Year:** General Economics. Assistant Professor BROWN

(c) **First Year:** Agricultural Economics. Associate Professor STEWART

(d) **First Year:** Public Utilities. Assistant Professor GRAY

120. History of Economic Thought.—*Twice a week; both semesters. One unit.* Professor WESTON

122. Economic History of the United States.—*Twice a week; both semesters. One unit.* Professor BOGART

123. Industrial and Financial Organization of Society.—*Twice a week; both semesters.* Professor LEE

124. International Finance.—*Twice a week; both semesters. One unit.* Professor BOGART

130. Theory of Agricultural Economics.—*Twice a week; both semesters. One unit.* Associate Professor STEWART

131. Agricultural Resources and Prices.—*Twice a week; both semesters. One unit.* Assistant Professor NORTON

132. Agricultural Economics Research.—Only those who write acceptable theses will receive credit. *Once a week; both semesters. One to two units.* Associate Professor STEWART

143. The Administration of Industrial Relations.—*Twice a week; both semesters. One unit.*

Theory of Statistics.—See Mathematics 129.

144. Statistical Theory and Analysis.—*Twice a week; both semesters. One unit.* Assistant Professor DICKINSON

180. Management of Public Utilities.—*Twice a week; both semesters. One unit.* Assistant Professor GRAY

Courses for Graduates and Advanced Undergraduates

4. History of Money and Banking Institutions, with Particular Reference to the United States.—*Three times a week; first semester.* Professor LEE

8. Domestic and Foreign Exchange and the Money Markets.—*Three times a week; second semester.* Associate Professor WRIGHT

9. Advanced Theory and Practice of Banking.—*Three times a week; first semester.* Associate Professor WRIGHT

10. Corporation Finance and Management.—*Three times a week; second semester.* Professor ROBINSON

11. Industrial Consolidation.—Development; plans for controlling trusts. *Three times a week; first semester.* Professor ROBINSON

13. Marketing and Prices of Agricultural Products.—*Three times a week; first semester.* Associate Professor STEWART

14. Coöperation in Agriculture.—*Twice a week; second semester.* Dr. BARTLETT

15. Financing Agriculture.—*Three times a week; second semester.* Assistant Professor NORTON

17. Economic History of Agriculture.—*Twice a week; first semester.* Assistant Professor NORTON

18. Land Economics.—*Three times a week; second semester.* Associate Professor STEWART

24. Economic Development of Modern Europe.—*Three times a week; second semester.* Professor BOGART

25. Economic History of England.—*Three times a week; first semester.* Professor BOGART

29. International Commerce and Commercial Policies.—*Three times a week; second semester.* Professor LITMAN

30. World Markets.—*Three times a week; second semester.* Professor LITMAN

31. Organization of International Commerce.—*Three times a week; first semester.* Professor LITMAN

35. Corporation Finance.—*Three times a week; first semester.* Assistant Professor BROWN

36. Investments.—*Three times a week; second semester.* Professor ROBINSON

41. Labor Problems.—*Three times a week; first semester.* Assistant Professor BERMAN

42. The Labor Movement.—*Three times a week; second semester.* Assistant Professor BERMAN

43. Personnel Administration.—*Three times a week; second semester.* Dr. HELBING

44. Socialism and Economic Reform.—*Three times a week; first semester.* Dr. HELBING

51. Public Finance.—*Three times a week; first semester.* Professor HUNTER

52. Problems in Taxation, with Special Reference to Illinois.—*Three times a week; second semester.* Professor HUNTER

55. Economics of Insurance (Life).—*Three times a week; first semester.* Assistant Professor DICKINSON

56. Economics of Insurance (Property).—*Three times a week; second semester.* Assistant Professor DICKINSON

58. Urban Land Economics.—*Three times a week; first semester.* Assistant Professor DICKINSON

61. Economic Theory.—*Three times a week; both semesters.* Assistant Professor WASSERMAN

71. Economic Statistics.—*Three times a week; first semester.* Assistant Professor NORTON

72. Economic Statistics (Business Barometers).—*Three times a week; second semester.* Assistant Professor NORTON

81. Principles of Public Utilities.—*Three times a week; first semester.* Assistant Professor GRAY

82. Regulation of Public Utilities.—*Twice a week; second semester.*
Associate Professor DILLAVOU

83. Public Utility Rates.—*Three times a week; second semester.*
Assistant Professor GRAY

EDUCATION

For a master's degree in education, courses 123, 124 and 125 are required. For students who have not taken a course in the history of education as undergraduates, Education 11 or Education 30 is required. When the thesis requirement is waived a student may be excused from taking Education 124. For a master's degree without a thesis, a comprehensive examination is required.

Education 6, 10 and 25 are required as prerequisites for all graduate courses.

Courses for Graduates

101. Educational Theory.—*Twice a week; second semester. One unit.*
Professor CAMERON

102. Research in History of American Education.—*Once a week; two hours; both semesters. One unit.*
Professor SEYBOLT

104. Educational Administration.—*Twice a week; first semester. One unit.*
Assistant Professor WEBER

106. High School Administration.—*Once a week; two hours; first semester. One unit.*
Professor CLEMENT

110. Methods of Teaching.—*Once a week; two hours; first semester. One unit.*
Professor MONROE

119. Curriculum Construction.—*Once a week; two hours; second semester. One unit.*
Professor MONROE

120a. Supervision in Secondary Education.—*Once a week; two hours; second semester. One unit.*
Professor CLEMENT

120b. Supervision of Elementary Education.—*Twice a week; second semester. One unit.*

121. Educational Measurement.—*Once a week; two hours; second semester. One unit.*
Associate Professor ODELL

123. Educational Statistics.—*Once a week; two hours; both semesters. One unit.*
Associate Professor ODELL

124. Theory of Educational Research.—*Once a week; two hours; both semesters. One unit.*
Professor MONROE

125. Educational Psychology.—*Once a week; two hours; first semester. One unit.*
Professor CAMERON

127. High-School Curricula.—*Once a week; two hours; first semester. One unit.*
Professor CLEMENT

129. The Junior College.—*Once a week; two hours; second semester. One unit.*
Professor CLEMENT

131. Analysis and Evaluation of High-School Texts.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

133. Studies in Secondary Education.—*Once a week; two hours; first semester. One unit.* (Not offered 1931-32.) Professor CLEMENT

141. Problems in the Teaching of English in the Secondary School.—*Once a week; two hours; both semesters. One unit.* Professor PAUL

150. Thesis.—*Both semesters. One or two units.* Professor MONROE and others

164. Public School Finance.—*Once a week; two hours; second semester. One unit.* Assistant Professor WEBER

165. School Surveys.—*Once a week; two hours; first semester. One unit.* Associate Professor ODELL

170. Public School Business Administration.—*Once a week; two hours; second semester. One unit.* (Not offered 1931-32.) Assistant Professor WEBER

184. Seminar in School Administration.—*Once a week; two hours; second semester. One unit.* Assistant Professor WEBER

185. Seminar in Educational Psychology.—*Once a week; two hours; second semester. One unit.* Professor CAMERON

186. Seminar in Secondary Education.—*Once a week; two hours; both semesters. One unit.* Professor CLEMENT

187. Seminar in Vocational Guidance.—*Once a week; two hours; second semester. One unit.* Professor MAYS

190. Research in Education.—*Once a week; two hours; second semester. One unit.* Professor MONROE

Courses for Graduates and Advanced Undergraduates

4. Problems of Educational Administration.—Interpretation of present tendencies. *Three times a week; first semester.* Assistant Professor WEBER

11. Ancient and Medieval Education.—*Twice a week; first semester.* Professor SEYBOLT

18. Educational Measurements.—*Three times a week; both semesters.* Associate Professor ODELL

20a. Supervision of Secondary Education.—*Twice a week; first semester.* Professor CLEMENT

26. The Junior High School.—*Twice a week; second semester.* Professor CLEMENT

27. High-School Curricula.—*Twice a week; second semester.* Professor CLEMENT

30. History of American Education.—*Twice a week; second semester.* Professor SEYBOLT

41. Vocational Education.—*Three times a week; second semester.* Professor MAYS

42. Special Education.—*Twice a week; first semester.* Dr. DOLCH

43. Mental Tests.—*Three times a week; second semester.* Professor CAMERON

44. Educational Psychology.—(Laboratory course.) *Three times a week; first semester.* Professor CAMERON

45. Psychology of Learning.—*Once a week; second semester.* Dr. POTTHOFF

49. Principles of Intellectual Development.—*Three times a week; second semester.* Associate Professor GRIFFITH

53. Problems of Industrial Education.—*Three times a week; both semesters.* Professor MAYS

54. Function and Methods of Part-time Teaching.—*Twice a week; first semester.* Professor MAYS

54a. Curriculum Construction in the Part-time Schools.—*Twice a week; second semester.* Professor MAYS

55. Problems of Vocational Guidance.—*Three times a week; first semester.* Professor MAYS

ELECTRICAL ENGINEERING

The prerequisite for graduate work in electrical engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in electrical engineering in the branches of the subject in which registration is desired.

Graduate students who wish to take a minor in electrical engineering must have had differential and integral calculus, and one year's work in college physics.

Courses for Graduates[1]

101. Advanced Course in Alternating Currents.—The theory of transient phenomena; polyphase circuits; measuring apparatus. *Twice a week; both semesters. One and one-half units.* Professors PAINE, REICH

103. Electrical Designs.—*Twice a week; second semester. One unit.* Assistant Professor WALDO

105. Electrical Engineering Research.—*Twice a week; both semesters. One to three units.* Professors PAINE, TYKOCINER, BROWN, REICH

ENGLISH LANGUAGE AND LITERATURE

Students who enter on graduate work with English as their major subject are required to give evidence of their ability to write good English. They must present the equivalent of fourteen hours of undergraduate work in English literature, the required college work in rhetoric, and the equivalent of four semesters of college work in Latin, or in Greek, or in French, or in German. After the first year of graduate work a knowledge of French and German is indispensable.

Students making English their minor may be admitted to such courses as in the judgment of the instructor in charge they are qualified to pursue.

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[1]Courses offered to junior and senior students are open for minor credit to students majoring in other departments.

The Degree of Master of Arts in English.—In addition to complying with the general rules of the Graduate School, candidates for the degree of Master of Arts in English must comply with the following rules of the Department of English: (1) They must choose a portion of their work from the group of courses described as "for graduates;" (2) must offer an elementary course in Anglo-Saxon; and (3) must take besides the regular semester examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Master of Arts in Public Speaking.—Candidates for the degree of Master of Arts in public speaking must comply with the following regulations: (1) They must satisfy the general requirements of the Department of English for admission to graduate work; (2) must offer a minor in English of not less than two units selected from the 100 courses in English literature; (3) must take, besides the regular examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Doctor of Philosophy in English.—Candidates for the degree of Doctor of Philosophy in English may expect to be examined on the entire field of the English language and literature. They are urged, furthermore, to acquaint themselves as fully as possible with the history and philosophy of the period in which their main interest lies, and with the foreign languages and literature most closely related to English and that period.

Courses for Graduates

101. Research in Special Topics.—*One or two units.*
Professors GRAHAM, BERNBAUM, PAUL, E. C. BALDWIN, ZEITLIN, JONES; Associate Professors HILLEBRAND, JEFFERSON, SANDFORD; Assistant Professors RINAKER, PARRY, SECORD, FLETCHER, FINNEY

111. Caedmon and Cynewulf.—*Twice a week; first semester. One unit.* (Not given 1931-32.)

114. The Development of the Essay.—The English essay; continental influences; classical origins. *Twice a week; both semesters. One unit.* Professor ZEITLIN

120. History and Principles of Literary Criticism.—*Twice a week; second semester. One unit.* Assistant Professor FINNEY

121. History of Rhetorical Theory.—*Twice a week; first semester. One unit.* Associate Professor SANDFORD

128. Literature of the Sixteenth Century.—*Twice a week; both semesters. One unit.* Professor JONES

130. Tragedy.—*Twice a week; both semesters. One unit.* Associate Professor HILLEBRAND

135. Problems in American Literature.—*Twice a week; both semesters. One unit.* Professor PAUL

138. The Romantic Movement.—*Twice a week; both semesters. One unit.* Professor BERNBAUM

140. Investigations in Modern English Literature.—(For second-year and third-year graduate students who are preparing theses for the doctor's degree.) *Once a week; three hours; both semesters. One to three units.* (May be taken in successive years.) Professor BERNBAUM

141. Literature of the Seventeenth Century.—*Twice a week; both semesters. One unit.* Professor E. C. BALDWIN

143. The History and Theory of Prose Fiction.—*Once a week; two hours; both semesters. One unit.* Professor BERNBAUM

145. Studies in Eighteenth Century Literature.—*Twice a week; both semesters. One unit.* Professor GRAHAM

146. The Text of Milton.—*Twice a week; second semester. One unit.* Assistant Professor FLETCHER

147. Shakespeare and Elizabethan Drama.—Critical study of the chief plays, *Twice a week; both semesters. One unit.* (Not given 1931-32.)

148. Seminar in Elizabethan Drama.—*Twice a week; second semester. One unit.* (Not given 1931-32.)

Courses for Graduates and Advanced Undergraduates

A. ENGLISH LANGUAGE AND LITERATURE

3. The Poetry of Milton.—*Three times a week; second semester.* Professor E. C. BALDWIN

8. Old English (Anglo-Saxon).—*Three times a week; first semester.* Professor JONES

9. Beowulf.—*Three times a week; second semester.* Professor JONES

25. Chaucer.—*Three times a week; first semester.* Professor JONES

26. Spenser.—*Three times a week; second semester.* Professor JONES

30. Tendencies in American Fiction since 1870.—*Three times a week; second semester.* Dr. TUPPER

31. English Literature from 1688 to 1789.—*Three times a week; second semester.* Assistant Professor SECORD

35. The English Drama (Previous to Shakespeare).—*Three times a week; first semester.* Associate Professor HILLEBRAND

36. The English Drama (Exclusive of Shakespeare) from 1600 to 1700.—*Three times a week; second semester.* Associate Professor HILLEBRAND

38. The Arthurian Tradition.—*Three times a week; second semester.* Assistant Professor PARRY

39. Introduction to Medieval Literature.—*Three times a week; first semester.*
Assistant Professor PARRY

43. Browning.—*Three times a week; second semester.* Professor GRAHAM

45. The Development of the Modern Drama.—*Three times a week; first semester.*
Associate Professor HILLEBRAND

50. Language and Literature of the First Half of the 17th Century.—*Three times a week; second semester.* Professor ZEITLIN

54a-54b. Introduction to Comparative Literature.—*Three times a week; both semesters.*
Professors OLDFATHER, OLIVER, ARON, BERNBAUM; Associate Professors VAN HORNE, HAMILTON, PERRY; Assistant Professor PARRY; Dr. BUSEY

56. Tennyson.—*Three times a week; first semester.* Professor GRAHAM

57. Great Foreign Novelists in Relation to the English Novel.—(Goethe, Hugo, Manzoni, Balzac, Dumas, Flaubert, Zola, Turgenev, Dostoevski, Tolstoi.) *Twice a week.* Professor BERNBAUM

B. RHETORIC

17. Advanced Composition.—*Three times a week; first semester.*
Assistant Professor RINAKER

46. Dramatic Composition.—*Three times a week; second semester.*
Associate Professor HILLEBRAND

C. PUBLIC SPEAKING

4. Advanced Debating.—*Three times a week; both semesters.*
Associate Professor SANDFORD

6. Persuasion and the Forms of Public Address.—*Three times a week; first semester.* Associate Professor SANDFORD

7. Masters of Public Address.—*Three times a week; second semester.*
Associate Professor SANDFORD

8. Dramatization.—*Three times a week; first semester.* Mr. SWANSON

11. Play Production.—*Three times a week; second semester.* Mr. SWANSON

D. SCANDINAVIAN LANGUAGES

Preparation for major graduate work in the Scandinavian languages or literature must include a good knowledge of one of the Scandinavian languages and systematic work in the undergraduate courses in Scandinavian. Any graduate student in language may, however, be admitted to the purely philological courses.

Courses for Graduates

101. Old Norse.—Introduction to the language; grammar; reading of the Prose Edda in part, and selections from the sagas. *Twice a week; both semesters. One unit.* (Not given in 1931-32.)

102. Old Danish and Interpretation of Oldest Runic Inscriptions.—*Twice a week; second semester. One unit.* (Not given in 1931-32.)

110. Advanced Old Norse (Old Norse Poetry).—Critical study of the Poetic Edda. *Twice a week; both semesters. One unit.* (Not given in 1931-32.)

130. The Runic Inscriptions (Introduction to Primitive Germanic).—*Twice a week; second semester. One unit.* (Not given in 1931-32.)

150. Research.—Special problems in Scandinavian philology or literature. *Once a week. One-half to one unit.* (Not given in 1931-32.)

ENTOMOLOGY

The prerequisite for graduate work in entomology is two years of undergraduate biology, including zoology and entomology. Entrance on major work in entomology requires at least six hours of entomology. A reading knowledge of French and German is desirable by the beginning of the second year.

Courses for Graduates

102. Research in the Morphology and Embryology of Insects.—*Once or twice a week; both semesters. One-half to two units.* Associate Professor HAYES

107. Insect Anatomy.—Lectures and Laboratory. *Three times a week; both semesters. One-half unit.* (Given 1930-31 and in alternate years.)
Associate Professor HAYES

108. Research in Economic Entomology.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

109. Research in Systematic Entomology.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF, Assistant Professor BALDUF

110. Research in the Biology and Ecology of Insects.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

Courses for Graduates and Advanced Undergraduates

6. Special Problems.—*Once or twice a week; both semesters.* Various instructors

10. Morphology and Taxonomy of Immature Insects.—Lectures and laboratory. *Three times a week; both semesters.* (Given in 1931-32 and in alternate years.)
Associate Professor HAYES

20. Insect Control.—Lectures and laboratory. *Three times a week; first semester.*
Professor METCALF

21. Insect Bionomics.—Lectures and reading. *Three times a week; second semester.* Professor METCALF

FARM ORGANIZATION AND MANAGEMENT

Graduate work leading to the degree of Master of Science in farm organization and management is open to students who have had a thorough training in the fundamental principles of the subject, either in connection with, or in addition to a course of study in agriculture substantially equivalent to that offered in this University. Such students must have had at least 8 hours of economics.

It is recommended that students preparing to enter graduate work in farm organization and management have, in addition to the required work for graduation in agriculture, 10 hours of work selected from the following courses: Farm Organization and Management 4, 5 and 6, Economics 3, 13, 14, 15, 17, 18, 51, 52, 61 and 71.

In qualifying for a master's degree in farm organization and management, a student must present credit in at least 2 units in economics courses which may apply toward either his major or minor. In fulfilling the requirements for the M.S. degree, the student must take not less than three units of work from 100 courses in farm organization and management, and in addition to presenting an acceptable thesis, he must show proficiency in his work as demonstrated in suitable examinations prescribed by the department. Courses in other departments which are recommended for the consideration of the student in completing the requirements for the M.S. degree include Animal Husbandry 29, 32, 112b, Economics 4, 13, 14, 15, 18, 61, 71, 101, 105, 130, 131.

In fulfilling the requirements for a minor in farm organization and management a student shall have had the equivalent of at least 20 hours of work in agriculture and economics and he shall take the equivalent of two units of work acceptable as graduate credit in farm organization and management, including one unit in Farm Organization and Management 101.

Courses for Graduates

101. Farm Organization and Management.—A study of principles, including an historical study of the contributions to the farm management field. *Twice a week; both semesters. One unit.* Associate Professor CASE

110. Farm Organization and Management Research.—Only those who write acceptable theses will receive credit. *Once a week; both semesters. One to two units.* Associate Professor CASE

Courses for Graduates and Advanced Undergraduates

4. Farm Operation.—*Twice a week; first semester.* Assistant Professor JOHNSTON

5. Farm Organization.—*Three times a week; second semester.* Associate Professor CASE

6. Land Tenure.—*Twice a week; first semester.* Associate Professor CASE

GENETICS

Those desiring a general training in genetics may take a major or minor in botany or zoology. Those desiring to approach agricultural problems through genetics may take a major or minor in agronomy, horticulture or animal husbandry.

For courses in the subject see departments of Agronomy, Animal Husbandry, Botany, Horticulture, and Zoology.

GEOLOGY

For graduate work in geology the student must have had at least a major in geology and an acceptable field training. Other graduate students with adequate technical preparation may be admitted to certain graduate courses.

For graduate work in geography the student must have had at least the equivalent of a major in geography.

Courses for Graduates

A. GEOLOGY

101. Advanced Crystallography.—*Twice a week; both semesters. One unit.*
Professor BAYLEY

102. Igneous Petrography.—Lectures; laboratory. *Twice a week; both semesters. One unit.* Professor BAYLEY

103. Metamorphic Petrography.—Lectures; laboratory. *Twice a week; first semester. One unit.* (Not given in 1931-32.) Professor BAYLEY

104. Pre-Cambrian Stratigraphy.—*Twice a week; second semester. One unit.* (Not given in 1931-32). Professor QUIRKE

108. Ore Deposition.—Problems in the origin of ore deposits, as illustrated by selected mining districts. *Three times a week; both semesters. One unit.* (Not given in 1931-32.) Professor BAYLEY

125. Sedimentation.—The interpretation of sedimentary rocks in terms of their origin. *Twice a week; first semester. One unit.* Assistant Professor WANLESS

135. Research.—*Once a week; both semesters. One-half to four units.*
Professors BAYLEY, SAVAGE, QUIRKE; Associate Professor BLANCHARD; Assistant Professors HOWARD, SUTTON, SHEPARD, WANLESS, CRICKMAY

142. Stratigraphic Paleozoic Paleontology.—The invertebrate index fossils of the successive geologic formations. *Twice a week; both semesters. One unit.*
Professor SAVAGE

143. Post-Paleozoic Stratigraphic Paleontology.—Stratigraphic study of post-Paleozoic formations with a consideration of characteristic fossils. *Twice a week; both semesters. One unit.* Assistant Professor SUTTON

151. Advanced Dynamic Geology.—A critical analysis of geologic processes and their results; the materials and structure of the earth; problems of geologic interpretations. *Three times a week; first semester. One unit.*

152. Advanced Historical Geology.—Cosmogeny; the record of diastrophism; the development of the continents and oceans; the relationship between oceanic fluctuations and organic differentiation and evolution; physiographic, climatic, and organic history. *Three times a week; second semester. One unit.*
Assistant Professor CRICKMAY

160. The Principles of Petroleum Geology.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Assistant Professor HOWARD

161. Applied Petroleum Geology.—*Twice a week; first semester. One unit.*
Assistant Professor HOWARD

162. The Theory and Application of Geophysical Methods.—*Twice a week; second semester. One unit.* Assistant Professor HOWARD

B. GEOGRAPHY

135. Research.—(Not given in 1931-32.)

Courses for Graduates and Advanced Undergraduates

A. GEOLOGY

9. Invertebrate Paleontology.—*Three times a week; first semester.*
Professor SAVAGE

15. Structural Geology.—Rock deformation and its results. *Three times a week; first semester.* Assistant Professor SHEPARD

16. Stratigraphy.—Fossil faunas, with special reference to Paleozoic invertebrates. *Three times a week; second semester.* Assistant Professor SUTTON

22. Mountain and Continental Structures.—*Three times a week; second semester.*
Assistant Professor SHEPARD

38. Regional Geology of the United States.—The characteristics of individual geologic provinces. Recitations. *Three times a week; first semester.*
Assistant Professor CRICKMAY

47. Systematic Mineralogy.—*Three times a week; first semester.*
Professor BAYLEY

48. Silicate Minerals and Rocks.—*Five times a week; second semester.*
Professor BAYLEY

49. Microscopic Mineralogy.—*Five times a week; second semester.*
Assistant Professor HOWARD

60a-60b. Introduction to Research.—*Two or four times a week; both semesters.*
Members of the department

95. Economic Geology.—The nature, occurrence, origin, and uses of coal, oil' building stones, and bedded deposits of economic importance. *Three times a week; first semester.* Assistant Professor HOWARD

96. Economic Geology.—The nature, occurrence, and origin of metaliferous deposits. Theories of ore deposition. *Three times a week; second semester.*
Professor QUIRKE

B. GEOGRAPHY

8. Geography of Europe.—*Three times a week; first semester.* Miss POGGI

10. Geography of Africa.—*Three times a week; first semester.* Dr. PAGE

11. Geography of Asia.—*Three times a week; first semester.* Miss POGGI

12. Historical Geography of the United States.—*Three times a week; first semester.* (Not given in 1931-32.)

14a. Climate of the Continents.—*Three times a week; second semester.* Dr. PAGE

53a-53b. Advanced Economic Geography.—*Three times a week; both semesters.*

60a-60b. Introduction to Research.—See Geology. Members of the staff

GERMAN

Germanic Languages and Literature

Students desiring to take German as a major are required to have finished successfully a four-year course of undergraduate work in German, or its equivalent. They are also required to be familiar with the principal works of the writers of the classical and modern periods of German literature, to show a general knowledge of the history of German literature, and to be able to follow lectures in the German language.

Of collateral subjects, a reading knowledge of French is important and is required for advanced graduate work. Some acquaintance with Latin and with German history is highly desirable.

Courses for Graduates

101. Seminar in the German Novel.—*Twice a week; both semesters. One unit.*
Professor ARON

102. Thesis.—*Both semesters. One-half to two units.*
Professors ARON, BROOKS; Associate Professor WILLIAMS

103. Introduction to the Historical Study of the Germanic Languages.—History of German philology; comparative grammar of the old Germanic dialects. *Twice a week; first semester. One unit.* Associate Professor WILLIAMS

105. Old High German.—Grammar and interpretation of the oldest literary documents. *Twice a week; second semester. One unit.* Associate Professor WILLIAMS

110. Early German Drama.—German drama up to the Reformation. *Twice a week; second semester. One unit.* Professor BROOKS

113. German Literature of the Fifteenth and Sixteenth Centuries.—*Twice a week; first semester. One unit.* Professor BROOKS

117. German Literature of the Seventeenth and Eighteenth Centuries.—*Twice a week; both semesters. One unit.* Professor ARON

121a. The Nibelungenlied.—*Twice a week; second semester. One unit.*
Associate Professor WILLIAMS

Courses for Graduates and Advanced Undergraduates

19a-19b. Goethe's Faust.—The Faust legend and early Faust books and plays; the genesis of Goethe's *Faust;* reading of both parts. *Twice a week; both semesters.*
Professor BROOKS

26a. German Literature up to 1800.—*Three times a week; first semester.*
Professor ARON

26b. German Literature since 1800.—*Three times a week; second semester.*
Professor ARON

31. Middle High German.—*Twice a week; first semester.*
Associate Professor WILLIAMS

32. History of German Civilization.—*Three times a week; second semester.*
Professor BROOKS

GREEK

(See Classics)

HISTORY

Graduate work in history requires two years of college work in this subject, or sixteen semester hours, which should ordinarily include introductory courses in European and American history. Linguistic preparation is important, especially in French and German. For medieval history some knowledge of Latin is essential, and Spanish is useful for certain fields of American history.

Advanced courses in history at the University of Illinois are of three kinds: (1) Courses for information and guidance in general reading. (2) Instruction in methodology, historiography, and bibliography. A part of this work (in course 103) is required of all graduate students in history during their first year. (3) Seminary courses for the study of special fields with a view primarily to training in the methods of historical criticism and research.

Illinois Historical Survey.—Students of history have an opportunity to pursue research in western history in connection with the Illinois Historical Survey, which is an organization for the purpose of carrying on systematic studies in the history of Illinois.

Attention is also called to the fact that the University of Illinois has for some time coöperated with the Trustees of the State Historical Library in the gathering and editing of archive material. As a result of this relation instructors and graduate students in the department have contributed from time to time to the publications of the Library and have been given useful training in the study of manuscript as well as of printed material.

Higher Degrees in History.—The following statement regarding the specific requirements for higher degrees in history is subject to the general requirements of the Graduate School.

Master of Arts

In addition to meeting the usual tests in the specific courses taken, each candidate for this degree will ordinarily be required to pass a general written examination early in the year and toward the close of the second semester an examination, also written, in two of the following fields: ancient history; medieval history of continental Europe; modern history of continental Europe; English history; American history; Latin-American history. The candidates are expected to have a general knowledge of historical methods (see course 103a). The department further requires a working knowledge of one important foreign language, ordinarily French or German.

Doctor of Philosophy

Major Requirements.—A candidate who selects history as his major subject may offer himself for examination in any four of the fields indicated below, stating also the particular field among these four in which he wishes to specialize and in which his thesis is to be written:

1. Ancient history. 2. Medieval history and institutions of continental Europe, to the close of the thirteenth century. 3. Continental Europe from 1300 to 1648. 4. Continental Europe and its dependencies since 1648 (except as included in 5 and 6). 5. The history of England and its dependencies (not including America before 1783). 6. The history of the United States. 7. The history of Latin America. This enumeration of fields is not to be regarded as excluding the possibility of accepting others as may be determined by the department in individual cases.

Minor Subjects.—A candidate for the doctorate in history may select as his first minor one of the divisions of the field of history listed above which is not offered as a part of his major. He should preferably, however, select his minors from subjects offered by other departments. The following list of suitable minors is intended to be suggestive rather than exhaustive or compulsory.

I. In Political Science.—(Any two acceptable for a first minor; any one, for a second minor.) 1. International law and diplomacy. 2. Modern government. 3. Municipal government. 4. Constitutional and administrative law and jurisprudence. 5. Political theory.

II. In Economics and Sociology.—(Any two acceptable for a first minor; any one, for a second minor.) 1. Economic history. 2. Economic theory. 3. Public and private finance. 4. Social reform. 5. Principles of sociology.

III. In Philosophy and Education.—(Any two acceptable for a first minor; any one, for a second minor.) 1. History of ancient and medieval philosophy. 2. History of modern philosophy. 3. History of education.

IV. In Literature.—Some division of the history of literature which may be either comparative literature of a limited period or the literature of a particular country for a more extended period as may be agreed upon in each case.

Courses for Graduates

101. Seminar in American History.—*Once a week; two hours; both semesters. One unit.*

Semester I: Introduction to research in American History. Professor HANSEN

Semester II: Guidance in the investigation of selected topics. Professor RANDALL

102. Seminar in English History.—A study of selected topics in the early modern period. *Arrange hours; both semesters. One unit.* Professor DIETZ

103a-103b. Historiography and Historical Method.—103a is required of all candidates for an advanced degree in history who do not present evidence of similar training elsewhere. *Twice a week; both semesters. One-half unit.*
Professor RANDALL, Associate Professor SWAIN

104. Seminar in European History.—*Once a week; two hours; both semesters. One unit.*

Semester I: Travels and Travelers in the Far East.

Semester II: Continental European Diplomacy during the great war.
Professor LYBYER

105. Research in Special Topics.—Guidance in writing theses for advanced degrees. *One to two units.*

Professors LARSON, LYBYER, ROBERTSON, PEASE, JONES, RANDALL, DIETZ, HANSEN; Associate Professors SWAIN, RODKEY; Assistant Professor DUNBAR, Dr. WERNER.

106. Seminar in Medieval History.—A study of selected topics in the history of the later middle ages. *Arrange hours; both semesters. One unit.* Professor LARSON

122. History of the West.—An intensive study of the westward movement, 1760-1816. *Twice a week; both semesters. One unit.* Professor PEASE

126. Spain in Europe and America, 1750-1825.—Bibliography, historiography, and topical reports. *Arrange hours; first semester. One unit.* (Not given in 1931-32.) Professor ROBERTSON

127. Spanish-American Relations.—Relations of the Latin-American nations with the United States. The Monroe Doctrine, intervention, etc. *Arrange hours; second semester. One unit.* (Not given in 1931-32.) Professor ROBERTSON

133. Studies in the History of Europe in the Nineteenth Century.—*Once a week; two hours; both semesters. One unit.* Associate Professor RODKEY

138. The History of France in the Seventeenth Century.—*Twice a week; both semesters. One unit.* Professor JONES

150. Seminar in Ancient History.—Problems in the relations of East and West. *Arrange hours; both semesters. One unit.* Associate Professor SWAIN

Courses for Graduates and Advanced Undergraduates

16a-16b. The American Colonies in the Eighteenth Century and the Beginnings of National Life and Organization.—*Three times a week; both semesters.* Assistant Professor DUNBAR

17a-17b. Social and Economic Forces in the United States in the Nineteenth Century.—*Three times a week; both semesters.* Professor HANSEN

19a-19b. The History of American Immigration.—*Twice a week; both semesters.* Professor HANSEN

20a-20b. History of the South.—*Twice a week; both semesters.* Professor RANDALL

21. Recent History of the United States.—*Twice a week; first semester.* Professor RANDALL

25. The Civil War and the Reconstruction.—*Three times a week; first semester.* (Not given in 1931-32.) Professor RANDALL

26. History of the Latin-American Colonies.—*Three times a week; first semester.* (Not given in 1931-32.) Professor ROBERTSON

27. History of Latin America from the Wars of Independence to the Present Time.—*Three times a week; second semester.* (Not given in 1931-32.) Professor ROBERTSON

29. America and Europe.—A study of the foundations of international intercourse in the later eighteenth and the early nineteenth century with particular reference to the Latin-American colonies and states. *Three times a week; second semester.* (Not given in 1931-32.) Professor ROBERTSON

30a-30b. The Mohammedan World.—*Three times a week; both semesters.* (Not given in 1931-32.) Professor LYBYER

32a-32b. The History of Europe, 1848-1928.—*Three times a week; both semesters.* Professor LYBYER

36a-36b. History of the German People in Medieval and Modern Times.—*Three times a week; both semesters.* Associate Professor RODKEY

37a-37b. History of Eastern, Central and Southern Asia.—*Three times a week; both semesters.* Professor LYBYER

38a-38b. Development of the French Monarchy in Early Modern Times, 1285-1648.—*Three times a week; both semesters.* (Not given in 1931-32.) Professor JONES

39a-39b. The Renaissance and the Reformation.—The transition from medieval to modern ideals. *Three times a week; both semesters.* Professor JONES

44a-44b. Constitutional History of England.—*Three times a week; both semesters.* Professor LARSON

46a-46b. The Industrial Revolution and English Social Politics, 1750-1928.—*Three times a week; both semesters.* (Not given in 1931-32.) Professor DIETZ

47a-47b. History of England in the Early Modern Period, 1399-1603.—*Three times a week; both semesters.* Professor DIETZ

48. Social and Economic History of the Middle Ages.—*Twice a week; second semester.* Professor LARSON

55. History of Greece.—*Three times a week; first semester.* Professor OLDFATHER

56. History of Rome.—*Three times a week; second semester.* Professor OLDFATHER

57a-57b. Ancient Imperialism, Hellenistic and Roman.—*Three times a week; second semester.* Associate Professor SWAIN

60. The United States in the World War.—*Three times a week; second semester.* Professor RANDALL

62a-62b. Political and Constitutional Development of the United States.—*Three times a week; both semesters.* Professor RANDALL

HOME ECONOMICS

Graduate work in home economics leading to the degree of Master of Arts or Master of Science is offered with a major in foods, nutrition, or in general home economics.

As preparation for graduate work in (a) foods or nutrition, the student must present chemistry, 20 hours (including quantitative and organic); bacteriology, 5 hours; physiology, 5 hours; foods and dietetics, 10 hours; and nutrition, 2 to 5 hours. According to the character of the thesis chosen, the student will take either Home Eco-

nomics 41 or 55, Chemistry 50a or 40 and 41. Combinations of courses in home economics with those in either chemistry or bacteriology may, upon the advice of the department, be offered.

As preparation for a major in (b) general home economics, the student will present food and dietetics, 10 hours; textiles and clothing, 8 hours; chemistry, 12 hours; physiology, 5 hours; principles of economics, 3 hours. For this major, the student will offer Home Economics 101 and other courses in home economics, education or economics.

Courses for Graduates

101. Home Economics.—*Twice a week; both semesters. One unit.*
Professor WARDALL

102. Research in Nutrition.—*Both semesters. One-half to three units.*
Assistant Professor————

103. Nutrition Seminar.—*Once a week; both semesters. One-half unit.*
Assistant Professor————

104. Research in Foods.—*Both semesters. One-half to three units.*
Assistant Professor WOODRUFF

105. Foods Seminar.—*Once a week; both semesters. One-half unit.*
Assistant Professor WOODRUFF

Courses for Graduates and Advanced Undergraduates

20. Infant Nutrition.—*Twice a week; first semester. One-half unit.* ————

28. Organization and Management of the Household.—*Twice a week; second semester. One-half unit.* Miss MUNGER

31. Clothing.—*Three times a week; second semester. One-half unit.*
Miss WHITLOCK

33. Diet in Disease.—*Three times a week; both semesters. One-half unit.*
Assistant Professor BARTO

35. Problems in Foods.—*Three times a week; second semester. One-half unit.*
Assistant Professor WOODRUFF

39a-39b. Readings in Food and Nutrition.—*Once a week; both semesters. One-fourth unit each semester.* Assistant Professors BARTO, WOODRUFF

41. Problems in Nutrition.—*Three to five times a week; second semester. One-half to one unit.* ————

43a-43b. Problems in Textiles and Clothing.—*Three times a week; both semesters. One-half unit.*
Assistant Professors JACOBSEN, WEAVER; Misses WHITLOCK, BARNES

45. Nutrition Classes.—*Twice a week; second semester. One-half unit.*
Assistant Professor BARTO

48. Institutional Dietaries and Administration.—*Three times a week; second semester. One-half unit.* Assistant Professor SMITH

50. Costume Design.—*Three times a week; second semester. One-half unit.*
Miss BARNES

51. Textiles.—*Twice a week; second semester. One-half unit.*
Assistant Professor JACOBSEN

55. Food and Nutrition.—*Five times a week; first semester. One unit.*

56. Child Development.—*Twice a week; second semester. One-half unit.*
Assistant Professor WALLS

57a-57b. Problems in Household Management.—*Three times a week; both semesters. One-half unit each semester.*

HORTICULTURE

Graduate work is offered in the Department of Horticulture leading to the M.S. and Ph.D. degrees. Candidates may specialize for either degree in floriculture, olericulture, or pomology.

Twenty hours of collegiate work in horticulture and allied subjects are required for entrance upon major work, and twelve hours for minor work.

Courses for Graduates

103. Olericulture.—*Both semesters. One to two units.* Professor LLOYD

105. Marketing Fruits and Vegetables.—*Three times a week; first semester. One to two units.* Professor LLOYD

108. Pomology.—*Both semesters. One to four units.*

(a) **Pomological Problems.** Professor BLAIR

(b) **Pomology and Fruit Breeding.** Professor DORSEY

(c) **Pomological Physiology.** Professor RUTH, Dr. KELLEY

(d) **Small Fruits.** Professor COLBY

(e) **Pomological Pathology.** Associate Professor ANDERSON

115. Floriculture.—*Both semesters. One to two units.*

(a) **Floricultural Problems.** Professor DORNER

(b) **Floricultural Physiology and Pathology.** Associate Professor WEINARD

120. Pomology Seminar.—*Once a week; both semesters. One-fourth unit.*
Professors DORSEY, RUTH; Associate Professor ANDERSON

125. Fruit Development.—*Three times a week; first semester. One unit.*
Professor DORSEY

130. Physiology of Fruit Production.—*Three times a week; first semester.*
Professor RUTH

135. Fruit Disease Research.—*Three times a week; first semester. One unit.*
Professor ANDERSON

140. Advanced Small Fruit Culture.—*Three times a week; second semester. One unit.* Professor COLBY

Courses for Graduates and Advanced Undergraduates

12. Evolution of Horticultural Plants.—*Three times a week; first semester.* Professor DORSEY

43. Greenhouse Fertilizers.—*Three times a week; first semester.* Associate Professor WEINARD

44. Pomology Seminar.—For seniors and graduates specializing in pomology. *Once a week; both semesters.* Professor RUTH

45. Plant Nutrition.—*Three times a week; second semester.* Associate Professor WEINARD

46. Marketing Horticultural Products.—Required inspection trip, expenses about $20. For seniors and graduates specializing in horticulture. *Three times a week; first semester.* Professor LLOYD

47. Fruit Storage.—The effects of environment upon fruits. The storage of fruits. *Three times a week; first semester.* Professor RUTH

51. Fruit Diseases.—*Three times a week; second semester.* Associate Professor ANDERSON

LIBRARY SCIENCE

Candidates for the master's degree in library science must have completed at least thirty semester hours' work in library science in this institution or in an approved institution.

Students desiring to prepare for work in special types of libraries will be expected to include at least one unit of advanced courses in appropriate subjects other than library science. All such changes in the program of the student must be approved by the Director of the Library School.

Courses for Graduates

101. Thesis.—*One to two units.* Professor WINDSOR and others

102. Seminar.—Special topics in library administration and history, and in bibliography. *Once a week; both semesters. One unit.* Professor WINDSOR; Assistant Professor BOYD and others

103. Advanced Reference Problems.—Transactions of societies; government publications; periodicals and indexes. *Twice a week; first semester. One-half unit.*

104. Advanced Cataloging and Classification.—Systems of book classification; comparative rules for cataloging books; bibliographical institutions. *Twice a week; second semester. One-half unit.* Assistant Professor BOND

Courses for Graduates and Advanced Undergraduates

7. History of Libraries.—The foundation, development, and resources of the leading libraries of Europe and the United States. *Twice a week; second semester.*

9. History of Books and Printing.—History of the early forms of books; the invention and spread of printing; the book trade; book-binding. *Twice a week; second semester.* (Not given in 1931-32.) Professor WINDSOR

13a. Public Documents.—Publications of the United States government and their use as sources of information. *Twice a week; first semester.* Assistant Professor BOYD

24a-24b. Selection of Books.—Foreign fiction; drama; poetry; special problems in selection. *Twice a week; both semesters.* Miss HOSTETTER

26b. Library Administration.—Library organization; work with children; special topics. *Three times a week; second semester.* Miss GRAMESLY and others

42. Public Documents.—Publications of American states and municipalities; publications of foreign governments. *Three times a week; second semester.* Miss JOHNSON

44. Bookbuying for Large Libraries.—The problems in book purchase which must be met in the order departments of large libraries. *Twice a week; first semester.* Miss GARVER

45. Library Buildings.—The planning of library buildings and the selection of equipment with special emphasis on the administrative aspects. *Twice a week; first semester.* Professor WINDSOR, Miss GRAMESLY

46. High-School Library Administration.—*Three times a week; second semester.* Miss HOSTETTER

MATHEMATICS

Students entering on graduate study with a major in mathematics must have had twenty-five hours of undergraduate work in mathematics, including a one-year course in calculus and one advanced course such as a course in theory of equations, or in differential equations. They should be able to read German and French.

Candidates for a doctor's degree taking a first minor in mathematics are expected to have completed a course in calculus and are required to take two one-year courses beyond the calculus; candidates for a doctor's degree taking a second minor are required to complete at least one course throughout a year beyond the calculus.

The courses offered by the department are arranged in cycles of two or of three years, so that a student will have opportunity to take any particular course offered by the department, for which he is qualified, in three years of residence required for the doctor's degree.

Courses for Graduates

100. Seminar.—*Three times a week; both semesters. One to two units.*
Professors CARMICHAEL, MILLER, SHAW, EMCH, COBLE; Associate Professors CRATHORNE, HAZLETT, LYTLE; Assistant Professors LEVY, BRAHANA, MARIA. For the master's degree: Dr. STEIMLEY, Dr. BAILEY, Dr. KETCHUM, Dr. BOURGIN, Dr. PEPPER, Dr. HOPKINS, Dr. OGG

101. Functions of Real Variables.—*Three times a week; both semesters. One unit.*

110. Elliptic Functions.—*Three times a week; both semesters. One unit.* (To be given in 1932-33.) Professor CARMICHAEL

112. Linear Difference Equations.—*Three times a week; both semesters. One unit.* Professor CARMICHAEL

113. Linear Differential Equations.—*Three times a week; both semesters. One unit.* (To be given in 1933-34.) Professor CARMICHAEL

124. The Theory of Numbers.—First semester: Theory of congruences and residues. Second semester: Theory of algebraic numbers. *Three times a week; both semesters.* Dr. PEPPER

126. Theory of Groups.—Introductory course. *Three times a week; both semesters. One unit.* Professor MILLER

129. Theory of Statistics.—The mathematical theory underlying statistics with applications to problems in economics, biology, and sociology. *Three times a week; both semesters. One unit.* (To be given in 1932-33.) Associate Professor CRATHORNE

131. Algebraic Geometry.—*Three times a week; both semesters. One unit.* Professor EMCH

135. Differential Geometry.—*Three times a week; both semesters. One unit.* Assistant Professor LEVY

139. Analysis Situs.—*Three times a week; both semesters. One unit.* Assistant Professor BRAHANA

141. Vector Methods.—*Three times a week; both semesters. One unit.* (To be given in 1932-33.) Dr. KETCHUM

143. Linear Algebras.—*Three times a week; both semesters. One unit.* (To be given in 1933-34.) Professor SHAW

145. Linear Operations.—*Three times a week; both semesters. One unit.* Professor SHAW

170. Algebra.—*Three times a week; both semesters.* Associate Professor HAZLETT

171. Analysis.—*Three times a week; both semesters.*

172. Geometry.—*Three times a week; both semesters.* Professor COBLE

Courses for Graduates and Advanced Undergraduates

16-17. Differential Equations and Advanced Calculus.—*Three times a week; both semesters.* Dr. BAILEY, Dr. STEIMLEY, Dr. KETCHUM

21. Theory of Probability.—*Three times a week; second semester.* Associate Professor CRATHORNE

22. Statistics.—May be counted only toward a minor in mathematics. *Three times a week; first semester.* Associate Professor CRATHORNE

30-31. Actuarial Theory.—*Three times a week; both semesters.* Associate Professor CRATHORNE

32. History of Mathematics.—*Three times a week; second semester.* (To be given in 1932-33.) Associate Professor LYTLE

35. Teachers' Course.—May be counted only toward a minor in mathematics. *Three times a week; both semesters.* Associate Professor LYTLE

36. Advanced Aspects of Euclidean Geometry.—*Three times a week; first semester.* Associate Professor LYTLE

40. Fundamental Concepts of Mathematics.—*Three times a week; second semester.* Associate Professor LYTLE

52. Differential Equations of Mathematical Physics.—*Three times a week; both semesters.* Dr. BOURGIN

53. Integral and Operational Equations in Mathematical Physics.—*Three times a week; both semesters.* (To be given in 1932-33.) Dr. BOURGIN

60. Introduction to the Theory of Numbers.—*Three times a week; second semester.* (To be given in 1932-33.) Dr. PEPPER

70. Introduction to Higher Algebra.—*Three times a week; both semesters.* Professor COBLE

71. Introduction to Higher Analysis.—*Three times a week; both semesters.* Assistant Professor BRAHANA

72. Introduction to Higher Geometry.—*Three times a week; both semesters.* Assistant Professor LEVY

MECHANICAL ENGINEERING

The prerequisite for graduate work in mechanical engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in mechanical engineering in the branches of the subject in which registration is desired.

Courses for Graduates[1]

107. Thermodynamics and Heat Motors.—*Twice a week; both semesters. One unit.* Associate Professor GOFF

108. The Flow of Fluids and Heat Transfer.—*Twice a week; either semester. One unit.* Associate Professor MACINTIRE

109. Mechanical Engineering Design.—*Twice a week; either semester. One unit.* Professor LEUTWILER

112. Laboratory Investigations.—*Three times a week; both semesters. One and one-half units.*
Professors WILLARD, KRATZ, POLSON, HAM; Associate Professor MACINTIRE

MECHANICS, THEORETICAL AND APPLIED

The prerequisite for the courses for graduates in theoretical and applied mechanics is the equivalent of the undergraduate courses in theoretical and applied mechanics and in allied engineering subjects required for the degree of Bachelor of Science in engineering.

[1]Courses offered to junior and senior students are open for minor credit to students majoring in other departments.

Courses for Graduates

101. Analytical Mechanics.—*Twice a week; first semester. One unit.*
Professor MOORE

102. Resistance of Materials.—*Twice a week; second semester. One unit.*
Professor MOORE

103. Hydraulics and Hydraulic Engineering.—*Twice a week; second semester. One-half to one unit.* Professor ENGER

104. Experimental Work in Laboratory of Applied Mechanics.—*Twice a week; both semesters. One to two units.*
Professors MOORE, ENGER; Associate Professor RICHART

105. Experimental and Analytical Work in Reinforced Concrete.—*Twice a week; both semesters. One to two units.* Associate Professor RICHART

106. Theory of Elasticity and Applications to Engineering Problems.—*Three times a week; both semesters. One unit.* Professor WESTERGAARD

Courses for Graduates and Advanced Undergraduates[1]

41. Advanced Mechanics of Materials.—*Three times a week; first semester.*
Professor SEELY

42. The Properties of Engineering Materials; Specifications and Inspection.—*Three times a week; second semester.* Professor SEELY

43. Laboratory Work in Hydraulics.—*Twice a week; first semester.*
Professor ENGER

44. Laboratory Work in Testing Materials.—*Three times a week; second semester.*
Professor MOORE

45. Advanced Statics.—*Three times a week; first semester.*
Professor WESTERGAARD

46. Advanced Statics.—*Twice a week; second semester.* Professor WESTERGAARD

METEOROLOGY

(See Geology)

MINERALOGY

(See Geology)

MINING ENGINEERING

The prerequisite for graduate work in mining engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in mining in the branches of the subject in which registration is desired.

In addition to the regular university laboratories, the laboratory connected with the investigation of mining conditions in Illinois now being carried on jointly by the

[1]Other courses offered senior students are open for minor credit to students majoring in other departments.

Engineering Experiment Station through the Department of Mining Engineering and the State Geological Survey is available for graduate instruction.

Courses for Graduates

101. Advanced Mining Practice.—*Twice a week; either semester. One unit.* Professor CALLEN

102. Advanced Preparation of Coal and Ores.—*Twice a week; first semester. One unit.*

104.[1] **Mining Reports.**—*Twice a week; either semester. One unit.* Professor CALLEN

105.[1] **Welfare Work and Education among Mine Employees.**—*Twice a week; either semester. One unit.* Professor CALLEN

106. Advanced Coal, Ore, and Metallurgical Plant Design.—*Twice a week; either semester. One unit.*

107. Advanced Non-Ferrous Metallurgical Projects.—*Twice a week; either semester. One unit.*

Courses for Graduates and Advanced Undergraduates

6. Mechanical Engineering of Mines.—*Three times a week; first semester.* Professor CALLEN

8. Mine Administration.—*Three times a week; first semester.* Mr. MITCHELL

9. Preparation of Coal and Ores.—*Three times a week; first semester.* Mr. MITCHELL

16. Non-Ferrous Ore Treatment.—The reduction of gold, silver, copper, lead and zinc ores. *Five times a week; second semester.* Mr. MITCHELL

15. Mine Ventilation.—*Twice a week; second semester.* Professor CALLEN

20. Mine Ventilation Laboratory.—*Twice a week; second semester.* Professor CALLEN

21. Mine Examination and Valuation.—*Three times a week; second semester.* Mr. NICHOLSON

41. Principles of Mining and Metallurgical Design.—*Three times a week; first semester.* Mr. MITCHELL

42. Mining and Metallurgical Design.—*Twice a week; second semester.* Mr. MITCHELL

64. Mining Laboratory.—*Twice a week; second semester.* Mr. MITCHELL

PHILOSOPHY

Students who enter on graduate work with philosophy as their major subject must have had a general course in the history of philosophy, a course in logic, and a general course in psychology.

[1] Of courses 104 and 105 only one will be given either semester, according to election of students; the same applies to courses 106 and 107.

Courses for Graduates

103. Ethics.—*Twice a week; first semester. One unit.* Professor DANIELS

105. Seventeenth Century Continental Thought.—*Twice a week; second semester. One unit.* Professor DANIELS

106. English and American Idealism.—*Twice a week; second semester. One unit.* Professor MORROW

107. Aristotle.—*Twice a week; first semester. One unit.* Professor MCCLURE

108. Plato.—*Twice a week; first semester. One unit.* Professor TAWNEY

110. Locke, Berkeley, Hume.—*Twice a week; first semester. One unit.* Professor MORROW

112. German Idealism.—*Twice a week; second semester. One unit.* Professor MCCLURE

114. Theory of Knowledge.—*Twice a week; first semester. One unit.* Assistant Professor BENJAMIN

116. Types of Logical Theory.—*Twice a week; second semester. One unit.* Assistant Professor BENJAMIN

118. Plato and the Platonic Tradition in Medieval Thought.—*Twice a week; second semester. One unit.* Professor TAWNEY

Courses for Graduates and Advanced Undergraduates

3. History of Ancient and Medieval Philosophy.—*Three times a week; first semester.* Professor MCCLURE

4. History of Modern Philosophy.—*Three times a week; second semester.* Professor MCCLURE

7. Ethics.—*Three times a week; second semester.* Professor MORROW

8. Philosophy of the Recent Past.—*Three times a week; first semester.* Assistant Professor NICHOLSON

9. Political and Social Ethics.—*Three times a week; first semester.* Professor MORROW

10. Principles and Concepts of Science.—*Three times a week; first semester.* Assistant Professor BENJAMIN

12. Philosophy of Art.—*Three times a week; first semester.* Dr. GOTSHALK

16. Metaphysics.—*Three times a week; second semester.* Dr. GOTSHALK

PHYSICS

A year of calculus and a year of general physics, with laboratory, are prerequisite for all major and minor work in physics. In addition, those majoring in physics must have had one more advanced course in either physics or mathematics and should be able to use references in German.

Courses for Graduates

104a-b. Electrical and Magnetic Measurements.—Credit will not be allowed for more than one of courses 15, 44a and 104a. *Two times a week of three hours each; both semesters. One unit.* Professor KNIPP; Associate Professor WILLIAMS

124. Conduction of Electricity through Gases.—*Three times a week; first semester. One unit.* Professor KNIPP

128. Problems and Methods in Theoretical Physics.—*Three times a week; first or second semester. One unit.* (Not given in 1931-32.)

129. Mechanical Vibrations.—The general theory, with applications to plates, rotating shafts, gyroscopes, structures, etc. *Twice a week; both semesters. One-half unit.* Professor KUNZ

132a. Dynamics.—*Four times a week; both semesters. One unit.* (Not given in 1931-32.) Professor KUNZ

132c. Hydrodynamics.—Especially modern problems in flow and turbulence. *Twice a week; both semesters. One-half unit.* (Not given in 1931-32.) Professor KUNZ

132e. Thermodynamics and Kinetic Theory of Matter.—*Three times a week; both semesters. One unit.* (Not given in 1931-32.) Professor KUNZ

132f. Theory of Elasticity.—*Three times a week; second semester. One unit.* (Not given in 1931-32.) Professor KUNZ

146. Electrodynamics.—*Four times a week; both semesters. One unit.* Professor KUNZ

147. Electric Oscillations.—*Twice a week; both semesters. One-half unit.* (Not given in 1931-32.) Professor KUNZ

170. Light.—Largely physical optics and spectroscopy. Lectures, assigned readings and recitations, with laboratory experiments. *Both semesters. One to two units.* Dr. ALMY

184. Line Spectra and Atomic Structure.—*Three times a week; first semester. One unit.* Professor LOOMIS

185. Band Spectra and Molecular Structure.—*Three times a week; second semester. One unit.* Professor LOOMIS

186a-b. Quantum Mechanics.—*Three times a week; both semesters. One unit.* Assistant Professor BARTLETT

190. Research.—*Both semesters.* Professors in the department

198. Seminar.—*Both semesters.* Professors in the department

199. Physics Colloquium.—Attendance is expected of all graduate students. *Once a week; both semesters. No credit.* Professor LOOMIS

Courses for Graduates and Advanced Undergraduates

14a-b. Theoretical Mechanics.—*Three times a week; both semesters.* Dr. ALMY

15. Electricity and Magnetism.[1]—Recommended to students in non-technical courses who wish a knowledge of electricity and magnetism beyond the course in general physics. Credit will not be allowed for more than one of courses Physics 15, 44a and 104a. *Two recitations or lectures and one three-hour laboratory exercise weekly; second semester.* Dr. SANDERS

16. Heat.—*Three times a week; first semester.* Associate Professor PATON

17. Light.[1]—Recommended to students in non-technical courses. *Two lectures and a three-hour laboratory period weekly; first semester.* Associate Professor SCHULZ

20a-b. Light.—For advanced students in physics, chemistry, mathematics or engineering. *Twice a week; both semesters.* Dr. ALMY

22a-b. Light Laboratory.—To accompany Physics 20a-b. *Twice a week; both semesters.* Dr. ALMY

23. Sound.—*Three times a week; first semester.* Professor WATSON

25. Architectural Acoustics.—*Twice a week; second semester.* Professor WATSON

30. Introduction to Theoretical Electricity.—For advanced students in physics, chemistry, mathematics, and engineering. *Three times a week; second semester.* Associate Professor WILLIAMS

36. Heat Laboratory.—To accompany Physics 16. *One three-hour period a week; first semester.* Associate Professor PATON

44a-b. Electrical and Magnetic Measurements.—Credit will not be allowed for more than one of courses Physics 15, 44a and 104a. *Two three-hour periods a week; both semesters.* Professor KNIPP; Associate Professor WILLIAMS

45. Kinetic Theory of Heat and Radiation.—*Three times a week; second semester.* Associate Professor PATON

46. Advanced Electrical Measurements.—*Two times a week of three hours each; first semester.* Associate Professor WILLIAMS

50. Theory and Use of Optometric and Other Optical Instruments.—*Four times a week; first semester.* Associate Professor SCHULZ

78. X-Rays.—*Three times a week; second semester.* (Not given in 1931-32.) Dr. SANDERS

PHYSIOLOGY

The prerequisites for graduate work in physiology are Physiology 1 or 4, 2 and 6 or equivalent.

Courses for Graduates

101. Journal Club.—Review of literature. *Both semesters. One-fourth unit.* Associate Professor BURGE

102. Research.—*Both semesters. One to two units.* Associate Professor BURGE

[1]This course may not be taken for major credit.

103. Special Phases of the Physiology of Respiration, Circulation, Digestion, Metabolism, Excretion, Secretion, Glands of Internal Secretion, Nervous System.—*Both semesters. One-half to one unit.* Associate Professor BURGE

Courses for Graduates and Advanced Undergraduates

9. Advanced Mammalian Physiology.—*Three times a week; first semester.* Associate Professor BURGE

POLITICAL SCIENCE

Graduate work in political science is conducted in the following special fields: (1) political theory; (2) international law and diplomacy; (3) modern government; (4) constitutional law, administrative law, and jurisprudence; (5) municipal administration.

To be admitted to take political science as a major subject, the student must have done at least 18 hours of undergraduate work in political science, economics, and history, not less than nine hours of which have been in political science. To take political science as a minor he must have had at least nine hours' work in these fields, including six hours in political science.

If a student making political science his major is taking both of his minors in other departments, one of them must be in history, economics, or sociology.

Several courses given in other departments are so closely related to those in political science that graduate students whose major is political science may be permitted on petition to take such courses as part of their major work. Attention is called to the courses in public law in the College of Law, the courses in city planning given by the Department of Horticulture, and the technical courses in municipal and sanitary engineering in the College of Engineering.

Courses for Graduates

101. History of Political Theories.—*Three times a week; first semester. One unit.* Professor GARNER

102. The Nature of the State.—*Twice a week; second semester. One unit.* Professor FAIRLIE

103. Seminar in Political Science and Public Law.—*Once a week; both semesters.* Members of the department

104. Municipal Administration.—*Twice a week; first semester. One unit.* Professor FAIRLIE

105. The American Constitutional System.—*Twice a week; first semester. One unit.* Professor MATHEWS

106a. Special Topics in International Law.—Research course. *Twice a week; first semester. One unit.* Professor GARNER

106b. Special Topics in International Law.—Research course. *Twice a week; second semester. One unit.* Professor GARNER

107. Foreign Relations of the United States.—*Twice a week; first semester. One unit.* (Not given in 1931-32.) Professor MATHEWS

108. Problems of International Organization.—Special problems in the field of international organization, with special attention to the League of Nations. *Twice a week; first semester. One unit.* (Not given in 1931-32.) Professor BERDAHL

112. Public Administration.—Studies in national or local administration in the United States. *Once a week; second semester. One unit.* Professor FAIRLIE

113. State Government and Administration.—*Twice a week; second semester. One unit.* (Not given in 1931-32.) Professor MATHEWS

114. Studies in Political Parties.—*Twice a week; second semester. One unit.* (Not given in 1931-32.) Professor BERDAHL

Courses for Graduates and Advanced Undergraduates

4. Municipal Government.—*Three times a week; first semester.* Assistant Professor KNEIER

5. Constitutional Law of the United States.—*Three times a week; second semester.* Professor MATHEWS

6a. International Law: Law of Peace.—*Three times a week; first semester.* Professor GARNER

6b. International Law: Law of War and Neutrality.—*Three times a week; second semester.* Professor GARNER

7. American Diplomacy.—*Three times a week; first semester.* Professor MATHEWS

8. International Organization.—*Twice a week; second semester.* (Not given in 1931-32.) Professor BERDAHL

9. Principles of Jurisprudence.—*Twice a week; second semester.* Professor FAIRLIE

10. Administrative Law.—*Twice a week; second semester.* (Not given in 1931-32.)

11. Constitutional Aspects of Social and Industrial Problems.—*Three times a week; first semester.* Assistant Professor HYNEMAN

12. National Administration in the United States.—*Three times a week; second semester.* Professor FAIRLIE

13. State Administration in the United States.—*Three times a week; second semester.* Assistant Professor HYNEMAN

14a. Political Parties: Party History and Issues.—*Three times a week; first semester.* (Not given in 1931-32; alternates with Political Science 14b.) Professor BERDAHL

14b. Political Parties: Party Organization and Methods.—*Three times a week; first semester.* (Not given in 1931-32; alternates with Political Science 14a.) Professor BERDAHL

17. Judicial Organization and Administration.—*Twice a week; first semester.* (Not given in 1931-32.) Professor MATHEWS

18. Legislation in the United States.—*Three times a week; second semester.* (Not given in 1931-32.)

21. British Government.—*Three times a week; first semester.* Professor FAIRLIE

22. Continental European Governments.—The political systems of France, Germany, Italy, Switzerland, and Russia. *Three times a week; second semester.* Professor GARNER

28. Problems of Contemporary Politics.—A survey of factors of major importance in domestic and foreign politics. *Three times a week; second semester.* (Not given in 1931-32.)

34. Municipal Problems.—Municipal administration in the United States and Europe. *Three times a week; second semester.* Assistant Professor KNEIER

PSYCHOLOGY

Graduate students who elect psychology as their major subject must have had standard courses, of university grade, both in general psychology and in the psychological laboratory. One general university course is the minimal requirement for graduate students who apply to the department for a minor subject.

102. Translation of Psychological Treatises.—Critical reading of French and German books and articles. *Both semesters. One-half unit.* Professor WOODROW

103. Research.—Experimental investigations. *Both semesters. One-half to two units.*

Professor WOODROW; Associate Professors CULLER, YOUNG; Assistant Professors HIGGINSON, WILLIAMS

105. Seminar.—Discussion of current topics in their historical setting, with especial emphasis upon research problems. *Both semesters. One unit.*

Professor WOODROW

106. Neural Theory of the Psychological Functions.—*Second semester. One unit.* Associate Professor CULLER

108. Quantitative Methods.—The logic of research methods in psychology. *First semester. One unit.* Associate Professor CULLER

Courses for Graduates and Advanced Undergraduates

4. Psychological Measurements.—Group experiments illustrating the methods of quantitative psychology. Laboratory course. *Twice a week; first semester.* Dr. MCALLISTER

5. Comparative Psychology.—A systematic survey of animal behavior with particular reference to the behavior of the vertebrates. Laboratory work and discussion. *Three times a week; second semester.* Dr. MCALLISTER

8. Feeling and Emotion.—A critical analysis of the facts, problems, and methods of affective psychology, with special reference to recent physiological studies. *Twice a week; second semester.* Associate Professor YOUNG

9. Physiological Psychology.—The physiological basis of conscious experience. *Twice a week; second semester.* (Not given in 1931-32.) Associate Professor YOUNG

11. Learning and Comprehension.—Processes and functions in acquiring new knowledge and skill. *Twice a week; second semester.* Associate Professor CULLER

12-13. Minor Problems (Advanced Laboratory).—Application of methods suitable to new problems in general and comparative psychology. *Three times a week; both semesters.*

Professor WOODROW; Assistant Professor HIGGINSON; Dr. MCALLISTER

14. Social Psychology.—Socialization viewed from the standpoint of the group and of the individual member. Socialization of psychological functions. Conflict and adjustment. *Three times a week; second semester.* Dr. SULLIVAN

16. Genetic Psychology.—*Twice a week; first semester.* Dr. SULLIVAN

17. The History of Psychology.—*Three times a week; second semester.* (Not given in 1931-32.)

18. Perception.—Perceptual experience; recent revisions of perceptual theory including the doctrine of the *Gestalt.* Lectures and discussions. *Twice a week; first semester.* Associate Professor CULLER

20. Systematic Psychology.—A critical study of contemporary systems: behaviorism, *Gestalt psychologie*, structural, functional and dynamic psychology. For seniors and graduates. *Twice a week; second semester.* Professor WOODROW

23. Abnormal Psychology.—Analytical consideration of types of behavior deviating from the normal. *Three times a week; second semester.* Assistant Professor WILLIAMS

30. Attention.—Lectures and discussions. *Twice a week; second semester.* Dr. MÖLLER

34. Individual Differences.—A study of the variation in the mental characteristics of individuals and of groups. For seniors and graduates. *Three times a week; first semester.* Professor WOODROW

RAILWAY ENGINEERING

The prerequisite for graduate work in railway engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in railway engineering in the branch of the subject in which registration is desired.

Courses for Graduates

102. Locomotive Design.—*Once a week; both semesters. One unit.* Professor YOUNG

106. Locomotive Operation.—*Once a week; both semesters. One unit.* Professor SCHMIDT

110. Railway Location.—*Twice a week; both semesters. One unit.* Professor KING

Courses for Graduates and Advanced Undergraduates

3. Locomotives.—*Twice a week; first semester.* Mr. SCHRADER

4. Locomotives.—*Three times a week; second semester.* Mr. SCHRADER

31. Railway Yards and Terminals.—*Three times a week; first semester.* Professor KING

33. Economic Theory of Railway Location.—*Four times a week; second semester.* Professor KING

35. Railway Signaling.—*Twice a week; first semester.* Professor KING

62-64. Electric Railway Laboratory and Practice.—*Five times a week; first semester.* Assistant Professor TUTHILL

70-74. Electric Railway Design and Economics.—*Five times a week; second semester.* Assistant Professor TUTHILL

ROMANCE LANGUAGES AND LITERATURES

Before entering on the study of Romance languages as a major for the degree of A.M., the candidate must have had at least (a) three years of college work in one Romance language, together with a satisfactory reading knowledge of another; or (b) two years of college work in each of two Romance languages. In either case a reading knowledge of German is highly desirable. Before being accepted as a recognized candidate for the degree of Ph.D., he must have had in addition, satisfactory training in Latin, and must be able to read ordinary German prose. Before entering on the study of Romance languages as a first or second minor, the candidate must have had two years of college work in the language desired.

FRENCH

Courses for Graduates

101. Old French Literature.—*Twice a week; both semesters. One unit.* Professor CARNAHAN

102. Villon, Rabelais, Montaigne, La Pléiade.—*Twice a week; both semesters. One unit.* Assistant Professor WILL

103. Seventeenth Century Prose Writers.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Professor OLIVER

104. Eighteenth Century Prose Writers.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Professor OLIVER

127. French Romanticism.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Professor CARNAHAN

128. Origin and Development of the Novel in France.—*Twice a week; both semesters. One unit.* Professor CARNAHAN

129. Special Problems in French Romanticism.—*Once a week; both semesters. One-half to one unit.* Professor CARNAHAN

132. French Lyric Poetry.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Professor MICHAUD

133. La Poésie de Victor Hugo.—*Twice a week; both semesters. One unit.* Professor MICHAUD

144. Le Réalisme et le Naturalisme français.—(In French.) *Twice a week; both semesters. One unit.* (Not given in 1931-32.) Professor MICHAUD

145. Doctrines Littéraires et Courant d'Ideés Contemporains.—(In French.) *Twice a week; both semesters. One unit.* Professor MICHAUD

175. Old French Phonology and Morphology.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Professor OLIVER

195. Seminar.—Research work in preparation for theses in French. *Both semesters. One to two units.* Members of the department

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of French Literature.—*Three times a week; both semesters.* Assistant Professor WILL, Dr. JACOB

17a-17b. French Drama of the Nineteenth Century.—*Twice a week; both semesters.* Associate Professor HAMILTON

24a-24b. French Drama of the Seventeenth and Eighteenth Centuries.—*Three times a week; both semesters.* Assistant Professor WILL

32a-32b. The French Novel in the Nineteenth Century.—*Three times a week; both semesters.* Dr. JACOB

33a-33b. La Littérature Contemporaine.—(In French.) *Twice a week; both semesters.* (Not given in 1931-32.) Professor MICHAUD

34a-34b. La Comédie Humaine de Balzac.—(In French.) *Twice a week; both semesters.* Professor MICHAUD

ITALIAN

Courses for Graduates

140. Italian Literature in the Middle Ages. Petrarch, Boccaccio.—*Twice a week; both semesters. One unit.* Associate Professor VAN HORNE

143. Italian Literature in the Renaissance.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Associate Professor VAN HORNE

146. Modern Italian Literature.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Associate Professor VAN HORNE

195. Seminar.—Research work in preparation for theses in Italian. *Both semesters. One to two units.* Associate Professor VAN HORNE

Courses for Graduates and Advanced Undergraduates

3a-3b. Dante.—*Twice a week; both semesters.* Associate Professor VAN HORNE

SPANISH

Courses for Graduates

130. Spanish Literature in the Sixteenth Century.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Associate Professor VAN HORNE

131. Spanish Literature in the Seventeenth Century.—*Twice a week; both semesters. One unit.* Associate Professor VAN HORNE

134. Spanish Literature in the Eighteenth Century.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Associate Professor HAMILTON

135. La Novela Española Moderna.—(In Spanish.) *Twice a week; both semesters. One unit.* Assistant Professor BALSEIRO

137. La Crítica Literaria en España.—(In Spanish.) *Twice a week; both semesters. One unit.* (Not given in 1931-32.) Assistant Professor BALSEIRO

138. Spanish-American Literature.—*Twice a week; both semesters. One unit.* (Not given in 1931-32.) Associate Professor VAN HORNE

185. Old Spanish Readings.—*Twice a week; both semesters. One unit.* Associate Professor HAMILTON

195. Seminar.—Research work in preparation for theses in Spanish. *Both semesters. One to two units.* Members of the department

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of Spanish Literature.—*Three times a week; both semesters.* Associate Professor HAMILTON

11a-11b. Masterpieces of the Golden Age. Don Quixote and Other Works.—*Twice a week; both semesters.* Dr. LUNDEBERG

17a-17b. El Teatro Español Moderno.—(In Spanish.) *Twice a week; both semesters.* Assistant Professor BALSEIRO

SOCIOLOGY

Preparation for major work in sociology must include at least the equivalent of twenty-three semester hours in the social and biological sciences, of which at least eight must be in sociology. The remaining fifteen hours may be distributed among economics, philosophy, history, psychology, political science and biology (heredity). A thesis is required of all candidates for the master's and the doctor's degrees. Preparation for graduate work in sociology as a minor requires at least six hours of credit in sociology.

Theses subjects may be chosen from any one of the following divisions of the sociological field: General and historical sociology; personality studies; culture theory and culture change; population studies; community studies; social pathology and social adjustment.

Courses for Graduates

100. Sociological Theory.—*Twice a week; first semester. One-half to one unit.* Assistant Professor HILLER

102a. Earlier Developments in Sociology.—*Twice a week; first semester. One unit.* (Not given in 1931-32.) Assistant Professor ALBIG

102b. More Recent Developments in Sociology.—*Twice a week; second semester. One unit.* Assistant Professor HILLER

103. Development of Culture.—*Twice a week; first semester. One unit.* Assistant Professor ALBIG

106. Urban Communities and Urbanization.—*Twice a week; first semester. One unit.* Assistant Professor TYLOR

107. Rural Communities.—*Twice a week; second semester. One unit.* Assistant Professor TYLOR

108. Research in the Social Effects of Poverty, and Their Prevention and Treatment.—*Twice a week; first semester. One unit.*

109. Research in Criminology.—*Twice a week; second semester. One unit.*
Professor TAFT

110. Population.—*Twice a week; first semester. One unit.* Professor TAFT

112. The Sociology of Conflict.—*Twice a week; second semester. One unit.*
Professor TAFT

126. Educational Sociology.—*Twice a week; second semester. One unit.*

128. Fusion of Culture Resulting from Immigration.—*Twice a week; second semester. One unit.* Assistant Professor HILLER

150. Seminar.—Preparation of theses. *One-half to two units.*
Members of the department

Courses for Graduates and Advanced Undergraduates

I. General Courses

3. Social Evolution.—*Three times a week; first or second semester.* Mr. AHRENS

4. Social Control.—*Twice a week; first or second semester.*
Assistant Professor ALBIG

6. Urban Sociology.—*Three times a week; first semester.*
Assistant Professor TYLOR

7. Rural Sociology.—*Three times a week; second semester.*
Assistant Professor TYLOR

II. Specialized Courses

8. Charities.—*Three times a week; first or second semester.* Dr. TIMMONS

9. Criminology.—*Three times a week; first or second semester.* Professor TAFT

10. Problems of Population.—*Three times a week; second semester.*
Assistant Professor HILLER

14. Group Opinion.—*Three times a week; first semester.* Assistant Professor ALBIG

17. Methods of Sociological Research.—*Three times a week; first semester.*
Assistant Professor HILLER

24. Penology.—*Three times a week; second semester.* Professor TAFT

27. Community Organization.—*Three times a week; second semester.*
Dr. TIMMONS

28. Immigration and Assimilation.—*Three times a week; first semester.*
Assistant Professor HILLER

29. Human Migrations.—*Three times a week; first semester.* Professor TAFT

30. Races of Mankind.—*Three times a week; first semester.*
Assistant Professor KELLY

40. Ethnology of the American Indians.—*Three times a week; second semester.* (Not given in 1931-32.) Assistant Professor KELLY

42. Early Civilizations.—*Three times a week; second semester.*
Assistant Professor KELLY

44. Negro Origins.—*Three times a week; second semester.*
Assistant Professor KELLY

45. Prehistoric Archeology.—*Three times a week; first semester.*
Assistant Professor KELLY

TRANSPORTATION

Transportation may be taken as a major or minor for the master's degree and as a minor for the doctorate. No student will be admitted to graduate work in transportation unless he has a satisfactory acquaintance with the principles of economics and in addition such knowledge of the general problems of transportation as is represented by the content of the undergraduate course on the transportation system of the United States.

Course for Graduates

100. Economics of Transportation.—*Once a week; both semesters. One unit.*
Assistant Professor LOCKLIN

Courses for Graduates and Advanced Undergraduates

3. Industrial Traffic Management.—*Three times a week; second semester.*
Assistant Professor LOCKLIN

7. Railroad Finance.—*Three times a week; first semester.*
Assistant Professor LOCKLIN

8. Railroad Organization.—*Twice a week; first semester.*

10. Railroad Rates.—*Three times a week; second semester.*
Assistant Professor LOCKLIN

16. Railroad Operation.—*Three times a week; second semester.*

22. Ocean Shipping.—*Three times a week; first semester.* Professor LITMAN

26. Railroad Problems.—*Three times a week; second semester.*
Assistant Professor LOCKLIN

ZOOLOGY

At least sixteen semester hours of college work in zoology are required for entering on major graduate study in this subject. Under special circumstances advanced work in closely allied subjects may be accepted in lieu of the fourth semester's work in zoology. When zoology is chosen for a minor the courses listed for graduates and undergraduates must be preceded by at least one full year's undergraduate work in zoology.

For the prosecution of graduate study in zoology a reading knowledge of German and French is indispensable and familiarity with Latin and Greek is of great advantage.

Graduate students specializing in zoology are strongly advised to spend at least one summer in study at the seashore. Every candidate for the doctor's degree will be required to furnish evidence of having completed satisfactorily at least one eight-week period in such work at an approved location. To facilitate this plan an investigator's room has been provided at the Woods Hole Marine Biological Laboratory, where

members of the department are offered research facilities without cost to themselves. Application for the use of this room should be made to the head of the department early in the year. Similar facilities are sometimes afforded at other marine laboratories.

Students interested in the field of genetics are referred especially to courses 115 and 124.

Courses for Graduates

102. Evolution of the Vertebrates.—*Twice a week; first semester. One-half unit.* (Given in 1931-32 and in alternate years.) Assistant Professor ADAMS

107. Parasitology.—*Once or twice a week; both semesters. One unit.* (Given in 1932-33 and in alternate years.) Professor WARD

109. Physiological Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1932-33 and in alternate years.) Professor SHELFORD

110. Economic Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1931-32 and in alternate years.) Professor SHELFORD

111. Experimental and Field Ecology.—*Both semesters. One-half to two units.* Professor SHELFORD

115. Factors of Individual and Racial Development.—*Twice a week; both semesters. One unit.* Professor ZELENY

117. Faunistic Zoology.—Taxonomy and distribution, with especial reference to the local fauna. *Three times a week; first semester. One unit. Second semester. One-half to one unit.* Professor VANCLEAVE

127. Theories of Animal Phylogeny.—Relations of various groups of animals; signification of so-called intermediate forms; invertebrate larval forms and theories of descent based on them. *Once or twice a week; both semesters. One unit.* (Given in 1931-32 and in alternate years.) Professor WARD

Individual Research Courses

121. Invertebrate Morphology and Parasitology.—*One to two units.* Professor WARD

122. Vertebrate Morphology.—*One to two units.* Assistant Professor ADAMS

123. Faunistic and Systematic Zoology.—*One to two units.* Professor VANCLEAVE

124. Experimental Zoology and Genetics.—*One to two units.* Professor ZELENY

125. Animal Ecology and Behavior.—*One to two units.* Professor SHELFORD

126. Embryology and Cytology.—*One to two units.* Professor SHUMWAY

Courses for Graduates and Advanced Undergraduates

11. Experimental Ecology and Geography.—*Three or four times a week; first semester.* Professor SHELFORD

17. Field Zoology.—*Three times a week; first semester.* Professor VANCLEAVE

19. Advanced Ornithology.—*Twice a week; first or second semester.* Dr. CAHN

20a-20b. Current Investigations.—Must be taken by all graduate students majoring in zoology. *Once a week; both semesters.* Members of the department

21a-21b. Introduction to Zoological Research.—*Two to five times a week; both semesters.* Professor WARD

22-23. Morphology of Vertebrates.—*Two to four times a week; both semesters.* Assistant Professor ADAMS

63-66. Comparative Vertebrate Embryology.—*Two or four times a week; both semesters.* Professor SHUMWAY

INDEX

Accountancy, 21
Admission, 9
Agronomy, 22
Amount of work for master's degree, 12
Animal Husbandry, 23
Architecture, 25
Astronomy, 26

Bacteriology, 26
Biological laboratories, marine, 12
Board of Trustees, 2
Botany, 27
Business Law, 29
Business Organization and Operation, 29

Calendar, 5, 6
Ceramic Engineering, 30
Changes in study-lists, 10
Character of graduate work, 9
Character of masters' degrees, 11
Chemistry, 31-36
Civil Engineering, 36
Classics, 37
Contents, Table of, 3, 4
Credit, transfer of graduate, 12

Dairy Husbandry, 39
Degrees, application for, 13
  Doctor's, 15
  in August, 13
  Masters', 11
  Professional, in Engineering, 14
Deposit, for laboratory material, 20
  for printing thesis, 17
Diploma fee, 20
Doctor's degree, 15
  examination for, 16
  in engineering, 17
  period of study, 15
  residence, 15
  work in other universities, 15
  special regulations, see name of department as Classics, History, etc.

Economics, 40
Education, 44
Electrical Engineering, 46
Engineering, doctor's degree in, 17
  Master's degree in, 14, 15
  Professional degree in, 14
  Architectural, 14, 25
  Ceramic, 14, 30
  Civil, 14, 36
  Electrical, 14, 46
  Mechanical, 14, 64
  Mining, 14, 65
  Physicist, 14, 67
  Railway, 14, 73
English Language and Literature, 46
Entomology, 50
Examinations for doctor's degree, 16
Executive Faculty, 7
Expenses, 20
  board, 20
  room, 20

Faculty, Executive, 7
Failures, 11
Farm Organization and Management, 50
Fees, 20
Fellowships, 18

Final examination for doctor's degree, 16
Foreign language for master's degree, 12
French, 74

Genetics, 51
Geography, 53
Geology, 51
German, 54
Grades, 13
Graduate Club, 20
Greek, 37, 55

History, 55
  of Graduate School, 9
Home Economics, 58
Horticulture, 60

Incidental fee, 20
Italian, 75

Laboratories, marine biological, 12
Language and Literature, English, 46
  Germanic, 54
  Romance, 74
Language examination for doctor's degree, 16
  foreign, for master's, 12
Latin, 38
Libraries, 18
Library Science, 61
Listeners' courses, 10

Majors, 12, 15, 17
Marine biological laboratories, 12
Master of Arts, degree of, 11
  See also special requirements of various departments, as Economics, Chemistry, etc.
Master of Science, degree of, 12
Master's degree in Engineering, 14
Mathematics, 62
Matriculation fee, 20
Mechanical Engineering, 64
Mechanics, Theoretical and Applied, 64
Medical Science, summer work in, 11
Meteorology, 65
Mineralogy, 65
Mining Engineering, 65
Minors, 12, 15, 17
Miscellaneous courses, 10

Organization of Graduate School, 9

Philosophy, 66
Physics, 67
Physiology, 69
Political Science, 70
Preliminary examinations for doctor's degree, 16
Professional degrees in Engineering, 14
Program of Study, 9
Psychology, 72
Public Speaking, 49

Railway Engineering, 73
Registration, 9
Residence study, 11, 15
Rhetoric, 49
Romance Languages and Literature, 74
Scandinavian Languages, 49
Scholarships, 18
Seniors and graduate study, 10
Sociology, 76

Spanish, 75
Staff, students on, 11
Summer study, 11

Theoretical and Applied Mechanics, 64
Thesis, Doctor's, 16
  Master's, 13
  printing doctor's, 17
Thesis work on leave of absence, 13
Transfer of graduate credit, 12
Transportation, 78
Trustees, Board of, 2
Tuition, 20

Undergraduate courses open to graduate students, 10

Visitors, 10

Withdrawal, 11
Work done elsewhere, 11, 12, 15

Zoology, 78

University of Illinois

The Graduate School

Announcements for 1932-1933

Published by
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URBANA

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*Deceased, April 29, 1932.

CONTENTS

PAGE

Board of Trustees 2
Graduate School Calendar 5
Executive Faculty 7

History and Organization

Admission 9
Character of Graduate Work 9
Registration and Program of Study 9
Masters' Degrees 11
Second Degrees in Engineering 14
The Degree of Doctor of Philosophy 15
Scholarships and Fellowships 18
Libraries 19
Fees and Expenses 20
Graduate Club 20

Departments of Instruction

Accountancy 21
Agricultural Economics 22
Agronomy 24
Animal Husbandry 25
Architecture and Architectural Engineering 28
Astronomy 28
Bacteriology 28
Botany 29
Business Law 31
Business Organization and Operation 31
Ceramic Engineering 32
Chemistry 33
Civil Engineering 38
Classics 40
  Greek 40
  Latin 40
Dairy Husbandry 41
Economics 42
Education 46
Electrical Engineering 48
English 48
  Language and Literature 50
  Rhetoric 51
  Public Speaking 51
  Scandinavian Languages 52
Entomology 52
Genetics 53
Geology (including Geography) 53

PAGE
German ... 55
History ... 56
Home Economics ... 60
Horticulture ... 61
Library Science ... 62
Mathematics ... 63
Mechanical Engineering ... 65
Mechanics, Theoretical and Applied ... 66
Mining Engineering ... 67
Philosophy ... 68
Physics ... 69
Physiology ... 71
Political Science ... 71
Psychology ... 73
Railway Engineering ... 75
Romance Languages and Literatures ... 75
French ... 76
Italian ... 77
Spanish ... 77
Sociology ... 78
Transportation ... 80
Zoology ... 80
Index ... 83

GRADUATE SCHOOL CALENDAR

SUMMER SESSION

1932

June 20, Mon.	Registration Day
June 21, Tues.	Instruction begins
July 4, Mon.	A legal holiday
Aug. 6, Sat., 12 m.	Last day for candidates for degrees in August to deposit theses
Aug. 12, 13, Fri., Sat.	Final examinations

FIRST SEMESTER

1932

Sept. 16, 17, Fri., Sat.	Registration Days
Sept. 19, Mon.	Last day for candidates for the degree of A.M. and M.S. in October to file applications for degrees and to deposit theses
Sept. 21, Wed., 8 a.m.	Instruction begins
Sept. 23, Fri.	Preliminary examination in French
Sept. 30, Fri.	Preliminary examination in German
Nov. 7, Mon.	Last day for candidates for professional engineering degrees to file statements of professional study and experience
Nov. 23, Wed., 11 a.m.	Thanksgiving recess begins
Nov. 28, Mon., 1 p.m.	Instruction resumed
Dec. 22, Thurs., 11 a.m.	Holiday recess begins
Dec. 31, Sat., 12 m.	Last day for candidates for professional engineering degrees to submit outlines of theses

1933

Jan. 3, Tues., 1 p.m.	Holiday recess ends
Jan. 21, Sat.	Preliminary examination in French
Jan. 24, Tues.	Semester examinations begin
Jan. 30, Mon.	Last day for filing applications for masters' degrees to be conferred in February
	Last day for candidates for the degrees of A.M., M.S., and Ph.D. in February to deposit theses
Feb. 1, Wed.	Semester examinations end
Feb. 4, Sat.	Preliminary examination in German

SECOND SEMESTER

1933	
Feb. 3, 4, Fri., Sat.	Registration days
Feb. 8, Wed., 8 a.m.	Instruction begins
Mar. 1, Wed.	Last day for applications for Scholarships and Fellowships for 1933-1934
April 13, Thurs., 11 a.m.	Easter recess begins
April 18, Tues., 1 p.m.	Easter recess ends
Apr. 28, Fri.	Preliminary examination in French
May 1, Mon.	Last day for candidates for professional engineering degrees to deposit completed theses
	Last day for filing applications for masters' degrees to be conferred in June
May 5, Fri.	Preliminary examination in German
May 15, Mon.	Last day for filing applications for masters' degrees to be conferred in August
	Last day for candidates for the degree of Ph.D. in June to deposit theses
May 26, Fri.	Semester examinations begin
May 29, Mon.	Last day for candidates for the degree of A.M. and M.S. in June to deposit theses
June 5, Mon.	Semester examinations end
June 12, Mon.	Sixty-second Annual Commencement

THE EXECUTIVE FACULTY

HARRY WOODBURN CHASE, PH.D., LL.D., L.H.D., PRESIDENT OF THE UNIVERSITY

ARTHUR HILL DANIELS, PH.D., *Professor of Philosophy and Dean of Graduate School*
ROGER ADAMS, PH.D., *Professor of Organic Chemistry*
ERNEST BERNBAUM, PH.D., *Professor of English*
EDWARD HERBERT CAMERON, PH.D., *Professor of Educational Psychology*
ARTHUR BYRON COBLE, PH.D., *Professor of Mathematics*
HERBERT FISHER MOORE, M.M.E., D.SC., *Research Professor of Engineering Materials*
REXFORD NEWCOMB, A.M., M.ARCH., A.I.A., *Professor of the History of Architecture*
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NATHAN AUSTIN WESTON, PH.D., *Professor of Economics*
ARTHUR CUTTS WILLARD, B.S., *Professor of Heating and Ventilation*
CHARLES ZELENY, PH.D., *Professor of Zoology*

HISTORY AND ORGANIZATION

The University of Illinois offered facilities for advanced study and research in various lines as early as 1872. Organized graduate instruction, however, under the name of the Graduate School, was first undertaken in 1892. In 1894 the administration of the school was vested in the Council of Administration, and the Vice-President of the University became Dean of the School. In 1906 the Graduate School was organized as a separate faculty, consisting of a dean and members of the university faculty assigned to this duty by the President.

By action of the Trustees the teaching faculty of the Graduate School includes all members of the university faculty who give instruction in approved graduate courses. The affairs of the School, however, are in charge of the Executive Faculty.

ADMISSION

Admission to the Graduate School may be granted to graduates of institutions whose requirements for the bachelor's degree are substantially equivalent to those of the University of Illinois, and to applicants from other institutions approved by the Executive Faculty, as hereinafter provided. *Admission to the Graduate School does not, however, imply admission to candidacy for an advanced degree, and gives no right or claim to be so admitted. Such candidacy is determined by the faculty after the student has demonstrated by his work here, for from two to five months, that he has the ability to do major work of graduate character. A mere accumulation of "credits" or "grades" is not sufficient.*

Admission to graduate courses may be granted only to those who have had the requisite undergraduate work in those courses or departments. But a student of mature age who satisfies the Dean and the department concerned of his ability to pursue graduate work in a given line may be enrolled in particular graduate courses, without reference to a degree, and permitted to carry on such study or investigation under the direction of a department of the University as the department shall recommend and the Dean approve.

Application blanks for admission may be secured from the Registrar of the University. Every applicant must submit with his application for admission an official transcript of his college record.

CHARACTER OF GRADUATE WORK

The principal aim of graduate study is the development of the power of independent work and the promotion of the spirit of research. Each candidate for a degree is expected to have a wide knowledge of his subject and of related fields of work; for the graduate student is not expected to get from lecture and laboratory courses all the knowledge and training necessary to meet the requirements for his degree.

REGISTRATION AND PROGRAM OF STUDY

The following regulations concerning registration and program of studies are laid out primarily for first-year students. Second-year and third-year graduate students fill out their programs irrespective of the unit value of courses, according to their needs, under the advice of their instructors.

Registration.—Each graduate student must register at the beginning of each semester. The registration of a new student may be accepted at any time provided the student is prepared to take up courses actually under way. Credit towards the fulfillment of the residence requirement dates, however, from the time of registration and not from the beginning of the semester or year in which the student enters. Registration will not be permitted later in the year than April 1, except in the case of students who expect to continue through the summer session, or are returning to complete a year's work which has been interrupted by unavoidable circumstances. *No student is permitted to attend any university course in which he is not registered.*

A new student must fill out in duplicate an application for admission and submit it to the Registrar, from whom, after the approval of his application, he will receive a card of admission and a study-list which will give details of procedure in registering. He should fill out the study-list after consultation with his adviser, or the person in charge of his major work, and also with the instructors whose courses he wishes to elect. *Registration, including the payment of fees, must be completed by the close of the registration days of the Graduate School. Otherwise a fee of $5.00 for late registration will be charged all former students.*

Changes in Study-Lists.—A graduate student is expected to plan his work so carefully that changes in his study-list during the semester will not be necessary. When a change seems advisable, however, it may be permitted without fee if made within three weeks of the date of registration. After that date a fee of one dollar is charged for each change, except that the total charge for rearrangement authorized on any one change slip shall not exceed two dollars.

Advanced Undergraduate Courses Open to Graduate Students.—

1. *Courses not open to students below senior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as unit courses for graduate credit, or as half-unit courses when listed for less than four hours of undergraduate credit.

2. *Courses open to students of junior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as half-unit courses for graduate credit, or as quarter-unit courses when listed for two to three hours undergraduate credit. Courses to which sophomores are regularly admitted may not be taken for graduate credit, either major or minor.

Seniors and Graduate Study.—If at the beginning of the second semester of his senior year a student who has been in residence at least one year is within five hours of a bachelor's degree, he may be permitted to register for courses which may count for residence for a master's degree, provided his program does not require more than twelve formal class, lecture, or laboratory exercises a week, and is approved by the Dean at the time of registration. Only students of excellent record will be allowed this privilege.

Miscellaneous and Listeners' Courses.—Graduate students are permitted under proper circumstances to attend classes as listeners, and to elect miscellaneous subjects, that is, courses which do not count toward an advanced degree. Listeners' cards may be obtained at the Dean's office. A graduate student in full standing and carrying a minimum program, may be permitted, under proper circumstances, to attend one class as a listener, or to elect one miscellaneous subject (that is, a course which does not count towards an advanced degree). No subject is open as a listener's or miscellaneous course unless it has a specific educational bearing on the student's major or minor subjects of study.

A student who elects a miscellaneous course is required to register in it, do the work, and pass the semester examinations, unless he is permitted to withdraw under the rules. A student who has a listener's card is not permitted to participate in the class work or the examination.

No student may register for a full minimum program of work for graduate credit if it is necessary for him to carry at the same time more than one miscellaneous subject and to visit one course.

Students on the Staff.—Assistants and others on the university staff who undertake to do graduate work are permitted to take an amount of work determined by the terms of their employment. Such a student, if required by his engagements to teach more than five classes a week or to have laboratory work or supervision exceeding ten hours a week, may not receive his master's degree at the end of one year, nor his doctor's degree at the end of three.

Residence and Work Done Elsewhere.—Continuous residence and study are required of all members of the Graduate School, unless they are granted leave of absence by the Dean, upon recommendation of the professor in charge of their work, for the purpose of carrying on elsewhere studies or investigation in the line of work for their degrees.

Graduate Study in the Summer.—Graduate students in the summer session are subject to the same scholastic requirements as those in the regular university year. Their study-lists must be approved by the Dean of the Graduate School, or his representative. Attendance during four out of six consecutive summer sessions, or one semester and two summer sessions, is considered the equivalent of one year in residence. The faculty is unwilling to accept summer-session work beyond the master's degree towards the doctor's degree, except in the case of a student who works in a summer session preceding or following a regular year's attendance at the University. In no case may the last year's work for the doctorate be done in disconnected summer sessions.

No course offered in the summer session may be taken for credit towards a higher degree unless it is described in the summer-session circular as accepted for that purpose.

Summer Work in Medical Sciences.—Graduate courses in medical sciences are offered in the summer quarter between June and September at the College of Medicine of the University of Illinois in Chicago. Circulars describing the courses offered and conditions of admission and work may be obtained from the Secretary of the College of Medicine, 1853 W. Polk Street, Chicago.

Failures.—A graduate student who fails in any course in his major subject cannot secure his degree in the same year in which the failure occurred. No condition examinations are given graduate students.

Withdrawal.—If after registration a graduate student wishes to withdraw from any course or to add other work, he must first secure the necessary papers from the Dean's office. See the regulations concerning changes in study-lists, page 10. If he wishes to withdraw from the University he must get clearance papers at the Dean's office.

MASTERS' DEGREES

Character of Masters' Degrees.—The master's degree conferred depends upon the character of the bachelor's degree. The usual practice is that A.M. shall follow A.B., and that M.S. shall follow B.S. However, this practice may be departed from in

cases where the undergraduate course of study of the candidate was of a kind for which some reputable institutions in this country give A.B., while others give B.S.

Amount of Work Required.—Candidates for the degree of Master of Arts or Master of Science are required to do at least one full year's work in residence, including a thesis. By this is meant from four to five unit courses each semester or their equivalent. A unit course is one which requires ten hours of time a week through one semester, or a minimum of 180 hours, irrespective of the mode of distribution of that time in class work, laboratory work, and private study. Four such courses or their equivalent constitute a full *minimum* program for one semester, and eight such courses, or their equivalent, constitute the *minimum formal* year's work accepted for a master's degree. Only first-rate students are permitted to secure a degree with this minimum program.

Unless otherwise permitted, every student must take each semester at least one course open to graduate students only (courses numbered 100 and upwards).

In the first year of his graduate study each student is required to attend a minimum of four formal class, lecture, or laboratory exercises a week. In no case is he permitted during his course to attend more than twelve a week, without permission.

Work Done Elsewhere.—Members of the staff and high-school teachers residing and employed in Urbana or Champaign who have done graduate work in approved institutions elsewhere may secure credit not to exceed four units towards the master's degree by passing examinations in that work. They may complete the work for the degree by securing at least four units more while registered in the Graduate School for not less than one academic year.

Students in zoology who take work in a marine or fresh-water biological laboratory or station are permitted to offer not less than six weeks nor more than nine weeks of such work in partial fulfillment of the requirement for the master's degree.[1] This privilege is granted only when the work is done with the permission of the faculty (secured in advance), in an approved laboratory, and under instructors accepted by the faculty. Credit for such work may be secured by examination after the student has submitted an official certificate of attendance at the laboratory or station, together with a full written report of the work done there. No candidate for the master's degree may avail himself of this provision who is not registered in the Graduate School for one full academic year, during which he shall do the rest of the work necessary for his degree.

Similar arrangements are made, under similar conditions, for students of geology in connection with Geological Surveys.

Majors and Minors.—A candidate for a master's degree may do all his work in one subject, or he may select a major and one minor, or a major and two minors. A major or minor denotes the field of knowledge of a department, or such part thereof as constitutes a separate and independent division of that field. For a master's degree a major is at least half the work, or a minimum of four units, for one year. Less than one unit may not be counted as satisfying the requirements of a minor without the approval of the department concerned.

Foreign Language.—The ability to use one or more of the modern languages ordinarily studied in the undergraduate curriculum is expected of all candidates for the master's degree, and in some lines of study is required. No student will be permitted to acquire residence toward the second year for the doctorate until he has

[1]The experience at a marine laboratory which, as indicated above, is optional with the candidate for the master's degree, is required of all candidates for the doctorate in zoology.

passed the preliminary examination in at least one of these languages. (This regulation becomes effective in September, 1933.)

Masters' Theses.—Each candidate for a master's degree is required to present a thesis on some subject approved by the professor in charge of his major work. Such approval, except in case of students working for masters' degrees in summer sessions only, must be secured and the subject of the thesis filed at the office of the Graduate School not later than the beginning of the second half year of residence.

Students working for masters' degrees exclusively in summer sessions must announce their thesis subjects not later than the beginning of their third session in residence. The requirement of a thesis may be waived, however, on the recommendation of the professor in charge of his major work and the approval of the Dean, *provided application to waive the thesis is made at the time for announcing thesis subjects.* A student excused from writing a thesis must replace it with additional courses of instruction.

No one will be excused from writing a thesis unless one-half of his program of studies consists of courses numbered 100 and upwards.

The thesis required from a candidate for a master's degree ordinarily will demand one-fourth of the student's time and may not exceed one-third of it. The thesis must be typewritten, on "thesis paper,"[1] and the title page must be printed. The thesis in its final form, together with a certificate of approval by the proper officer, must be left by the professor in charge at the Dean's office at least two weeks before the date on which the degree is to be conferred. No article prepared for another use, or previously published, will be accepted as a thesis.

Applications for Degrees.—Each candidate for the degree of Master of Arts or Master of Science shall file an application for the degree on a blank provided for the purpose, to be had at the Dean's office. For the dates of applications and of deposition of theses, consult the calendar at the beginning of the bulletin.

Degrees in August.—Students who expect to become candidates for the master's degree in August may be recommended at the June meeting of the Senate subject to the successful completion of the work for which they are to register in the summer session. However, in order to avail themselves of this privilege, students must file with the Dean before the June meeting of the Senate an exact statement of the work necessary to complete the requirements for the degree. Blanks for this purpose may be secured at the Dean's office.

Thesis Work on Leave of Absence.—Under proper conditions a student may be permitted to complete the last fourth of his work, if devoted to his thesis, under leave of absence for a period not to exceed the equivalent of two semesters. To get such permission the student must have secured credit for at least six units; must petition for the privilege; must submit to the Dean an outline of the proposed investigation, approved by the professor in charge of his major work, and must submit satisfactory evidence that adequate facilities are available to him at the place where he intends to do the proposed work. Approval on all these points must be obtained one collegiate year before the thesis is due. Immediately following approval the student must register and pay an incidental fee of $20.00.

Grades.—Students' work is graded in five classes, A, B, C, D, and E. The last indicates a failure. D indicates unsatisfactory, though passable work.

A student who receives two units of a grade below B during his first year of

[1]No other will be accepted by the Dean. "Instructions for the Preparation of Theses" may be obtained at the Dean's office.

graduate work may not complete the first year of residence by carrying the minimum program of eight units for the master's degree. Three units of a grade below B disqualify a student as a candidate for a degree.

A failure or absence from examination in any course or failure in any other examination prescribed by the department of the major may prevent the conferring of the degree; and, as already indicated, failure in any course in the major field precludes the conferring of the degree in the same year.

SECOND DEGREES IN ENGINEERING

Two classes of second degrees are open to graduates of the College of Engineering, namely, academic and professional.

The *academic* second degree in engineering is Master of Science, following Bachelor of Science, in architecture, architectural engineering, civil engineering, electrical engineering, etc. This degree is conferred in accordance with the regulations described above for *academic work in residence only*.

The *professional* second degrees in engineering are as follows:

Master of Architecture, after B.S. in architecture.

Architectural Engineer, after B.S. in architectural engineering.

Ceramic Engineer, after B.S. in ceramic engineering.

Civil Engineer, after B.S. in civil engineering or in railway civil engineering.

Electrical Engineer, after B.S. in electrical engineering or in railway electrical engineering.

Mechanical Engineer, after B.S. in mechanical engineering or in railway mechanical engineering.

Engineer of Mines, after B.S. in mining engineering.

Engineer-Physicist, after B.S. in engineering physics.

Professional degrees in engineering may be conferred on two classes of candidates: (1) those who have received an academic degree in engineering from the University of Illinois; (2) those who have received an academic degree in engineering from other institutions of equal standing and who have been members of the teaching or research staff of the College of Engineering or Engineering Experiment Station of the University of Illinois for at least three years prior to the conferring of the professional degree.

A candidate declares his candidacy by filing with the Dean of the College of Engineering, as chairman of the committee in charge, a detailed statement covering his professional engineering experience. This statement must be made upon a standard form supplied by the Dean of the College of Engineering, as chairman of the committee in charge, and must be filed not later than the first Monday in November preceding the commencement at which the candidate expects to receive the degree. No statement of experience will be considered by the committee which does not show that the candidate has had a minimum of four years of acceptable engineering experience after receiving the degree of Bachelor of Science, and that for at least three years he has been in responsible charge of engineering work. Responsible charge in engineering teaching may be considered as responsible charge of work. In determining the acceptability of the engineering experience of the candidate the committee will be guided by the character of his professional work and the degree of responsibility involved, and will take into consideration such evidences of professional ability and growth as may be shown by his investigation of engineering problems, his contributions to technical literature, and his membership and activity in engineering societies.

If the professional experience of the candidate is accepted he must submit for approval, prior to December 31, an outline of his proposed thesis. The completed thesis, in the form prescribed in the "Instructions for the Preparation of Masters' and Doctors' Theses," must be deposited with the Dean of the College of Engineering not later than May 1. The candidate must present himself at commencement in order to receive the degree.

A candidate for a professional engineering degree must pay the incidental fee of fifty dollars on being notified that his professional experience is accepted as qualifying him to enter as a candidate for the degree. No one will be enrolled as a candidate for the degree at the following commencement who does not pay his fee at this time. When a candidate for a professional engineering degree has once been accepted and paid his fee, he is eligible to receive the degree at any time within five years, without additional fee, on completion of the requirements; provided, however, that unless he completes the requirements within two years his name will be dropped from the list of candidates and in order to receive the degree within the five-year period he must register once more.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Major and Minor Subjects.—A member of the Graduate School who desires to become a candidate for the degree of Doctor of Philosophy is required to pursue a major subject in the department in which his research lies. He is also required to choose one minor subject, or he may choose two. If one minor only is chosen it must be taken in a department of study other than that of the major, and credit for it may be earned by work representing not less than four units, or one-sixth of the total residence required for the doctorate. If two minors are chosen, one must be a subject closely related to the major. With the approval of the adviser it may be a division of the major field of study. The other minor (not less than two units) must, in that case, be taken in a department of study other than that of the major.

Except by special permission of the Dean the preliminary examination in major and minor subjects may not be taken until the minor work has been done.

Method of Computing Residence.—Credit for a full year of graduate work means that the student has during that time devoted all his working time and energy to study of a graduate grade. After the first year of residence, credit is not recorded in units, and there is no fixed correspondence between credit and courses as in undergraduate work. Thus it is possible for a second-year student to devote all his time to one course and his research; and for a third-year student to devote all his time to his research alone.

Period of Study.—The *minimum* period of study required for securing the degree of Doctor of Philosophy is three years, during which the student is required to devote all his working time to his studies. All three years must be spent in resident graduate study at some accredited educational institution and either the first two or the last one of the three must be spent at the University of Illinois. The degree is conferred, however, not for residence during a certain period, but for scholarly attainments and power of investigation, as proved by a thesis and examinations.

Work Done in Other Universities.—Credit for graduate work done in other universities is not "transferred." However, it may be accepted on examination as equivalent to resident work at the University of Illinois, provided the institution in which it was done is of high standing.

Preliminary Examinations.—

A. In Languages.—The student will be required to demonstrate his ability to read French and German and other languages needed in his work. No student will be permitted to acquire residence towards the second year of graduate study until he has passed the examination in at least one of these languages. (This regulation becomes effective in September, 1933.) Both the examination in French and that in German must be passed before the student is admitted to the preliminary examination in his major and minor subjects. For the dates of these language examinations consult the calendar at the beginning of this bulletin.

Application for admission to these examinations must be made a week, at least, in advance of the date of the examination.

B. In Major and Minors.—Towards the end of his second year of study, or by special permission, at the beginning of his third year (not later than the first Saturday in October), a student who wishes to become a candidate for the degree must submit to a preliminary examination. This examination is intended to test the student's knowledge of the fields of his major and minor subjects of study only. It is partly oral, and may be wholly so.

The student will not be admitted to his preliminary examination until the faculty is satisfied that he has finished substantially the equivalent of two years' graduate work. He must do a full year's graduate work between his preliminary examination and the completion of his work for the doctorate.

Final Examination.—At least two weeks before the time when the degree is conferred, the candidate must submit to a final examination, given by a committee appointed by the Dean. This examination is primarily on the research work of the student, as embodied in his thesis, but it is not confined to that. It extends to the whole field of study of the candidate. It will not be confined to the courses which the candidate has attended in the University of Illinois only, if he has done part of the work elsewhere; nor even to the field covered by the courses specifically taken in this or other universities; but will be so conducted as to determine whether the candidate has a satisfactory grasp of his major subject as a whole, and a general acquaintance with the fields of knowledge represented by his course of study.

The final examination may not be divided. The examination must be taken all at one time even though it requires several sessions.

If after having passed his preliminary examination, he fails in the third year of his study to meet the expectations of the professors in charge of his work, or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

Other Examinations.—Before the candidate is admitted to the final examination and the defense of his thesis, he may be required to take any other examination, oral or written, that is thought proper by the various departments in which he has studied.

The above examinations are in addition to those in the courses for which the student is registered. These must be taken at the time for which they are set in the examination schedule.

Thesis.—The power of independent research must be shown by the production of a thesis on some topic connected with the major subject of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or as many of them as may wish to question him about it, in connection with his final examination.

The subject of the thesis should be chosen not later than the end of the second year of residence and must be submitted for formal approval by the faculty not later than six weeks from the beginning of his third year of residence.

A typewritten copy of the complete thesis, *on thesis paper*,[1] and in final form must be deposited in the office of the Dean for presentation to the examining committee not later than two weeks prior to the final examination and not less than four weeks before the time when the degree is conferred. At the same time, the candidate must deposit with the Dean a manuscript of the essential part, or an abstract, or a digest of his thesis, in condition for publication at a cost not to exceed seventy-five dollars ($75). The manuscript must be sufficient to show the method followed, the evidence used, and the conclusions reached in the investigation, and must bear the approval of the department and the Executive Faculty of the Graduate School.

The candidate must pay to the Comptroller before graduation the sum of seventy-five dollars ($75) out of which the University will print at least one hundred copies of this manuscript for circulation by the University, unless the thesis entire or in abbreviated form is published by the author or is accepted for publication by a standard journal or publisher within a year from the date of graduation. In the latter event, and after one hundred copies have been presented to the University by the writer, the cash deposit shall be returned to him.

The typewritten and printed forms of the thesis must comply with the regulations given in "Instructions for the Preparation of Masters' and Doctors' Theses," copies of which may be obtained at the Dean's office.

Degree of Doctor of Philosophy in Engineering

The degree of Doctor of Philosophy in Engineering is offered in certain lines of academic work of a high scholastic type in engineering science for students who wish to prepare themselves as teachers, investigators, and experts.

The general requirements for this degree, as to preliminary education, linguistic attainments, etc., are the same as in other subjects.

The following lines of engineering science, or others approved by the Graduate School, may be elected as majors:

Engineering mechanics
Steam engineering
Hydraulic and sanitary engineering
Electrical engineering
Heating and ventilation engineering
Railway engineering
Masonry construction and structural engineering
Coal-mining engineering
Ceramic engineering

The first minor may be any of the above or one of the following sciences or an authorized combination of two of them:

Theoretical mechanics
Mathematics
Thermodynamics
Bacteriology
Chemistry
Geology

[1]No other will be accepted by the Dean.

Physics (experimental or mathematical)
Zoology
Botany
Economics

The second minor should be in other than engineering subjects.

SCHOLARSHIPS AND FELLOWSHIPS

A number of scholarships and fellowships have been established by the Trustees of the University. To first-year graduate students of ability and promise, there are open a number of scholarships with a stipend of $300 each and freedom from tuition, incidental, and laboratory fees.[1] To second-year and third-year graduate students, that is, those who have had one or two years of graduate study, there are open fellowships with stipends of $400 and $500, with freedom from the above-mentioned fees. The larger stipend is given only to students who are expected to take their degrees within the year. Each holder of a fellowship or scholarship must pay the matriculation fee of ten dollars, unless he holds a first degree from the University of Illinois, and also the diploma fee of ten dollars on receiving his diploma.

Candidates for these scholarships and fellowships must be graduates of the University of Illinois, or of colleges or universities having equivalent requirements for bachelors' degrees.

Application must be made on blanks to be obtained from the Dean of the Graduate School. These application forms should be sent to the Dean of the Graduate School as early as possible in February of the academic year preceding that for which the fellowship is desired. No application will be considered if received later than March first, until after April fifteenth, the date when appointees from the first list of applications must accept or refuse their appointments.

Persons appointed are notified on April first and must send the Secretary of the Board of Trustees notice of their acceptance or refusal by April fifteenth; and must agree that, if accepted, the appointment will not be resigned to take a similar one in any other institution during the year for which it is awarded.

Nominations to fellowships are made on the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself. Scholarships and fellowships are not given to candidates who are over thirty years of age at the time when the appointment is to be made.

For second-year fellowships, adequate preparation in French or German, and for third-year fellowships, adequate preparation in both French and German is required.

An appointment as honorary fellow, without stipend, may be made as specified for paid fellowships in the case of any one who has shown distinguished merit in his work.

The Carr Fellowship in Chemistry.—The Honorable Robert F. Carr, of the class of 1893, gave in 1919 the sum of ten thousand dollars, the income of which is to be used as the stipendium of a fellowship in chemistry or chemical engineering. The stipend is $750.

DuPont Fellowship in Chemistry.—DuPont de Nemours and Company gives the University each year the sum of $750 for a fellowship in chemistry.

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[1]Up to a certain amount.

LIBRARIES

The general university library, including the departmental libraries and reading rooms listed below, are located at the University in Urbana. The libraries of the College of Pharmacy and the College of Medicine are in Chicago.

These libraries contained on July 1, 1931, about 877,000 volumes, and about 227,800 pamphlets. Of these, 832,643 books and 220,000 pamphlets are in the libraries at Urbana; the rest are in Chicago. The library at Urbana also contains 3,096 maps and 8,723 pieces of sheet music. The departments at Urbana currently receive about 6,000 serials, while the College of Medicine and College of Pharmacy in Chicago receive 250.

The general library of the University is open daily, from 8 a. m. until 10 p. m. and on Sunday from 2:30 p. m. until 5:30 p. m.

A number of departmental and college libraries and reading rooms are maintained in the library and in other buildings on the campus; these libraries do not necessarily contain all the books in the respective subjects. In some instances they are primarily for the use of the graduate students and advanced undergraduate students in the departments using the respective buildings. The principal departmental libraries and reading rooms are the following:

Name of Library	*Location*	*Estimated number of volumes*
Philosophy, Psychology, and Education	Library Building	5,300
Classics	Library Building	15,000
Modern Languages	Library Building	6,600
English	Library Building	6,400
History and Political Science	Library Building	20,100
Economics, Sociology, and Commerce Reading Room	Library Building	3,500
Natural History	Natural History Hall	50,970
Law	Law Building	38,650
Architecture, Ricker Library of	Architecture Building	9,180
Agriculture Reading Room	New Agriculture Building	20,400
Chemistry	Chemistry Building	14,390
Physics	Physics Building	1,600
Mathematics	Mathematics Building	10,820
Engineering	Engineering Hall	28,100

The Dittenberger Classical Library.—The University possesses the library of Wilhelm Dittenberger, at one time Professor of Classical Philology in the University of Halle. This library contains 5,600 items. It includes the works of the poets and prose writers, numerous works on grammar and history of literature, and between four and five thousand dissertations and programs on special topics. There are also many works dealing with other departments of classical philology, as epigraphy, history of ancient peoples, archeology, philosophy, history of art, geography, chronology, metrics, etc.

The Heyne Library of Germanics.—The library of Professor Moritz Heyne of the University of Göttingen was bought by the University. It contains about 5,200 volumes. The collection is rich in the general field of German philology and in lexicography. It has many rare first editions of works of German literature from the sixteenth, seventeenth, and eighteenth centuries and has sets of a number of rare periodicals.

The Gröber Library in Romance Languages.—The University also possesses the library of Professor Gröber of the University of Strassburg. This library contains about 6,500 titles.

The Vahlen Library, of the late Johannes Vahlen, contains about 10,000 volumes and is in itself an excellent working library in classical philological literature. It is well supplied with texts of Greek and Latin authors.

The Aron Library, collected by the late teacher and student of pedagogy, R. Aron, contains about 20,000 volumes. It is a scholarly collection of educational documents, among them many original and early editions, and furnishes first-hand material for the study of educational movements in Europe, especially in Germany, from the time of Luther and Comenius to the present. The collection of German "Fibeln" or school readers is unique, and the material for the history of juvenile songs and literature, the set of 17th and 18th century atlases, and the collection of rare hymn books and juvenilia make the collection very useful to students of education.

The Cavagna Library.—The library of the late Count Antonio Cavagna San-Giuliani di Gualdana has been bought by the University. It is estimated that the library contains about 40,000 volumes, besides many maps, manuscripts, and prints, making a notable collection for the study of Italian history, literature, and art.

FEES AND EXPENSES

Except as noted below, graduate students pay fees as follows:

Matriculation fee	$10.00
Incidental fee, each semester, for residents of Illinois	35.00
All students, not residents of Illinois, pay each semester an incidental fee of	62.50
Incidental fee for students registered for thesis work towards the master's degree on leave of absence	20.00
Diploma fee	10.00
For late registration	5.00
For change in study-list	1.00

All graduate students who have not matriculated as undergraduates at the University of Illinois pay the matriculation fee on entrance.

All graduate students pay the diploma fee.

No tuition or incidental fee is charged for graduate courses to scholars, fellows, or members of the corps of instruction or the staffs of the University libraries or of the scientific bureaus or experiment stations, who are appointed by the Board of Trustees, nor for undergraduate courses on their study-lists if approved by the heads of the departments and by the Dean of the School as necessary or desirable for the proper completion of the work for the degree. Otherwise graduate students who take undergraduate courses must pay the proper undergraduate fee.

Each student working in the laboratories, or in the drafting or engineering classes, is required to pay a fee of from 50 cents to $15.00 in each course for chemicals and apparatus used, and for any breakage or damage. But no charges or deposits for laboratory materials are required from scholars, fellows, or members of the corps of instruction or scientific staffs mentioned above, except when breakage or consumption of materials exceeds a certain allowance.

Table board may be obtained at prices ranging from $7 a week.

Room rent, single room, ranges from $20 a month; double room, $12.50 a month, each person.

THE GRADUATE CLUB

The Graduate Club is an unofficial organization of the graduate students and faculty. Its purpose is to furnish an opportunity for those working in different departments to become acquainted with one another and thus counteract the tendency toward narrowness which intense specialization may sometimes induce.

DEPARTMENTS OF INSTRUCTION

Courses open to graduate students are of two classes. The first class is wholly of graduate grade, and the courses are numbered 100 upwards. The second class includes the courses classified as for graduates and advanced undergraduates. These carry numbers below 100. The courses numbered 100 and upwards are all accepted for major credit. Those of the other group are in many cases accepted for minor credit only. This is especially true of courses which are open to juniors.

All courses have certain prerequisites for admission. Inasmuch as the prerequisite preparation may be gained at other institutions from courses differing from those offering a similar preparation at the University of Illinois, so that a statement of prerequisites as given here would not be understood elsewhere, their description is omitted altogether. However, a student who wishes to enter a particular course must satisfy the department concerned that he has had in some form the prerequisites for admission to the course.

For the convenience of first-year students the credit value of graduate courses is given in units. These values have no significance for second-year and third-year students.

The credit received for "courses for graduates and advanced undergraduates" is in accordance with the regulations of the Graduate School (see page 10).

Students are admitted to graduate standing in agriculture who have had a thorough training in the sciences underlying agriculture, and who are otherwise eligible to the Graduate School, even though their undergraduate course of study lacked to some extent the amount and kind of technical work in agriculture included in the course of study for the bachelor's degree in agriculture at the University of Illinois.

ACCOUNTANCY

A student may major in accountancy for the master's degree only. The courses may be taken for minor credit by applicants for the master's or doctor's degree in other departments with the approval of the adviser. The courses in accountancy for graduates only may be selected by those who have had approximately 15 university credits in accountancy, including Accountancy 3a or its equivalent. Accountancy 4a is a prerequisite for 104; 3b for 110; 13 for 113; and 20 for 120.

The courses for graduates and advanced undergraduates may be taken by those who have had the equivalent of 12 university credits in accountancy.

Courses for Graduates

103. Advanced Theory and History.—*Twice a week; both semesters. One unit.*
Professor LITTLETON

104. Accounting Systems.—*Twice a week; both semesters. One unit.*
Professor SCOVILL

110. Accounting Reports.—*Twice a week; second semester. One unit.*
Professor SCOVILL

113. Governmental Accounting.—*Twice a week; second semester. One unit.*
Professor MOREY

120. Income Tax Development.—*Twice a week; first semester. One unit.*
Professor FILBEY

129. Thesis.—*Once a week; both semesters. One unit.*
Professor LITTLETON and members of the staff

Courses for Graduates and Advanced Undergraduates

3a. Advanced Accounting.—*Three times a week; either semester.*
Professor FILBEY

3b. Auditing.—*Three times a week; either semester.*
Professors FILBEY, LITTLETON, Associate Professor THEISS

4a. Cost Accounting.—*Twice a week; either semester.*
Associate Professor SCHLATTER

4b. Accounting Systems.—*Twice a week; either semester.*
Assistant Professor BAILY

5a-5b. C.P.A. Problems.—*Three times a week; both semesters.* Professor SCOVILL

13. Governmental Accounting.—*Twice a week; either semester.*
Professor MOREY

20. Income Tax Procedure.—*Twice a week; second semester.* Professor FILBEY

30. Budgets and Accounting Control.—*Three times a week; either semester.*
Associate Professor THEISS

AGRICULTURAL ECONOMICS

Graduate students in agricultural economics may do their work in the general field of agricultural economics or specialize in any one of the following: (1) farm organization and management; (2) land economics; (3) agricultural marketing; and (4) agricultural prices and statistics.

Graduate work in agricultural economics as a major subject is open to students under either of two conditions: (1) the student must have done at least 20 hours of undergraduate work in economics, agricultural economics, business organization and operation, accountancy, history, political science, or sociology, of which at least 12 hours must have been in the field of economics and agricultural economics; or (2) the student must have had a thorough training in the principles of agricultural economics consisting of at least 12 hours credit in economics and agricultural economics, either in connection with or in addition to a course of study in agriculture substantially equivalent to that required for the bachelor's degree in agriculture in this University.

To take agricultural economics as a minor, the student must have had at least 20 hours work in agricultural and economic subjects. Two units in agricultural economics will be accepted as satisfying this requirement.

Graduate students who are making agricultural economics their major are required to take at least one course in advanced economic theory. Where such students are taking two minors in other departments, one of them must be in economics, business organization and operation, accountancy, sociology, history, or political science.

Certain courses given in other departments are so closely related to those in agricultural economics, a graduate student whose major is in agricultural economics,

may be admitted on approval of the departments concerned to take such courses as part of his major work. Attention is called to graduate courses in economics, transportation, accountancy, business organization and operation, and sociology, as well as those in other departments in the College of Agriculture.

Courses for Graduates

109. Seminar. Thesis course.—(Formerly Economics 118c and Farm Organization and Management 110). All graduate students majoring in Agricultural Economics must register in Agricultural Economics 109; credit is conditional upon the completion of an acceptable thesis. *Once a week; both semesters. One to two units.*
Members of the department

110. Theory of Agricultural Economics.—(Formerly Economics 130). *Twice a week; both semesters. One unit.* Associate Professor STEWART

111. Agricultural Prices and Statistics.—(Formerly Economics 131). *Twice a week; both semesters. One unit.* Assistant Professor NORTON

112. Agricultural Economics Research.—(Formerly Economics 132). Credit is conditional upon the completion of an acceptable report of investigation. *Once a week; both semesters. One to two units.* Associate Professor STEWART

120. Farm Management Principles and Investigational Methods.—(Formerly Farm Organization and Management 101). *Twice a week; both semesters. One unit.* Professor CASE

135. Marketing Fruits and Vegetables.—(Formerly Horticulture 105). *Three times a week; first semester. One to two units.* Professor LLOYD

Courses for Graduates and Advanced Undergraduates

10. Economics of Agriculture.—(Formerly Economics 16). *Three times a week; first semester.* Dr. BARTLETT

14. Cooperation in Agriculture.—(Formerly Economics 14). *Twice a week; second semester.* Dr. BARTLETT

15. Financing Agriculture.—(Formerly Economics 15). *Three times a week; second semester.* Assistant Professor NORTON

17. Economic History of Agriculture.—(Formerly Economics 17). (Not given in 1932-33.) *Twice a week; first semester.* Assistant Professor NORTON

18. Land Economics.—(Formerly Economics 18). *Three times a week; second semester.* Associate Professor STEWART

22. Types and Systems of Farming.—(Formerly Farm Organization and Management 2). Required field trip, expense about $3. *Three times a week; first semester.*
Professor CASE, Associate Professor WILCOX

23. Farm Business Analysis.—(Formerly Farm Organization and Management 3). Required field trip, expense about $10. *Three times a week; second semester.*
Assistant Professor JOHNSTON

24. Farm Operation.—(Formerly Farm Organization and Management 4). Required field trip, expense about $3. *Twice a week; first semester.*
Assistant Professor JOHNSTON

25. Farm Organization.—(Formerly Farm Organization and Management 5). Required field trip, expense about $10. *Three times a week; second semester.*
Professor CASE, Assistant Professor JOHNSTON

26. Land Tenure.—(Formerly Farm Organization and Management 6). *Twice a week; first semester.* Professor CASE

30. Marketing and Prices of Agricultural Products.—(Formerly Economics 13). *Three times a week; first semester.* Associate Professor STEWART

31. Grain Grading and Marketing.—(Formerly Agronomy 14). Required inspection trip, expense about $15. (Not given in 1932-33.) *Three times a week; second semester.* Associate Professor PIEPER

34. Marketing Dairy Products.—(Formerly Dairy Husbandry 26). *Twice a week; second semester.* Dr. BROWN

36. Marketing Horticultural Products.—(Formerly Horticulture 46). Required inspection trip; expense about $20. For seniors and graduates specializing in horticulture. *Three times a week; first semester.* Professor LLOYD

37. Marketing Live Stock.—(Formerly Animal Husbandry 32). The class will visit a terminal live stock market; estimated cost of the trip, $18. *Twice a week; second semester.* Associate Professor ASHBY

38. Livestock Marketing Problems.—(Formerly Animal Husbandry 12). *Once a week; first semester.* Associate Professor ASHBY

AGRONOMY

Graduate students may take work in agronomy leading to the M.S. and Ph.D. degrees. They may specialize for either degree in soil fertility, soil physics, soil biology, plant breeding, or crop production.

For either degree, if two minors are chosen, the first should be, and both first and second may be, taken in a department other than agronomy. If only one minor is chosen, it must be in a field outside of the department.

A candidate for the master's degree in agronomy must present an acceptable thesis, and show proficiency in his work as demonstrated by suitable examinations, prescribed by the department.

Fifteen college credits in agronomy and related subjects are prerequisites for a minor, and five additional credits are prerequisites for a major. Students must have had the fundamental work in science, prerequisite to the major and minor fields of study. Those with unusually good training in science may be permitted by the department to waive certain of the above mentioned requirements.

Courses for Graduates

101. Soil Investigations. *Twice a week; first semester. One unit.*
Professor DETURK

104. Seminar.—*Once a week; both semesters. One-fourth unit.*
The Graduate Staff

111. Advanced Soil Biology.—*Once a week; first semester. One-half to one unit.* (Not given in 1932-1933.) Professor DeTurk

112. Advanced Plant Genetics.—*Twice a week; first semester. One unit.* Professor Woodworth

114. Advanced Crop Production.—*Twice a week; second semester. One unit.* Professor Burlison, Associate Professor Dungan

118. Research.—A special problem is chosen by each student. Graduate students taking a thesis should so indicate in registering in Agronomy 118. *Both semesters. One-half to four units.* Soils—Professors Bauer, DeTurk, R. S. Smith; crops—Professors Burlison, Woodworth, Associate Professor Dungan.

119. Experiment Station Problems.—See Animal Husbandry 103. Professor Mumford

Courses for Graduates and Advanced Undergraduates

7. Crop Production.—*Three times a week; first semester.* Professor Burlison, Associate Professor Dungan

10. Genesis, Morphology, Classification, and Geography of Soils.—*Three times a week; second semester.* Professor R. S. Smith

11. Microorganisms in Relation to Soil Fertility.—*Three times a week; second semester.* Associate Professor Sears

13. Soil Management.—*Three times a week; second semester.* Professor Bauer

22. Plant Genetics.—*Three times a week; second semester.* Professor Woodworth, Mr. Bonnett

29. Field Plot Technic.—*Three times a week; first semester.* Professor Woodworth, Mr. Mumm

30. Metabolism of Soil Microorganisms.—*Three times a week; first semester.* Associate Professor Sears

31. Biological Methods of Soil Investigation.—*Three times a week; first semester.* Associate Professor Sears

32. Physical Methods of Soil Investigation.—*Three times a week; first semester.* Mr. Stauffer

33. Chemical Methods of Soil Investigation.—*Three times a week; first semester.* (Not given 1932-33.) Professor DeTurk

ANIMAL HUSBANDRY

The department of animal husbandry offers graduate work leading to the degree of Master of Science and the degree of Doctor of Philosophy. For a major or minor for the master's degree the student may specialize in the general field of animal production, or in the special fields of animal genetics, animal nutrition, animal pathology and poultry husbandry. For a major or minor for the doctor's degree he may specialize in animal genetics, the economics of meat production, animal nutrition, and animal

pathology. Advanced work in poultry husbandry may be taken for a minor for the doctor's degree.

For registration for a minor in animal husbandry a student must offer at least 15 college credits in the field, including the principles of feeding, the principles of genetics, livestock production and livestock judging, and he must have had an introductory course in organic chemistry. For a major a student must offer at least 5 additional college credits in animal husbandry or in courses related to the major field of specialization. Besides these general requirements, a student must have had the special training required for effective graduate study in the field of his chosen major: For work in animal production, the economics of meat production; for work in poultry husbandry, an introductory course in farm management; for work in animal genetics, at least an introductory course in general zoology; for work in animal nutrition, a satisfactory course in quantitative chemical analysis, and preferably also a course in animal physiology; for work in animal pathology, training in histology, physiology, bacteriology, and hygiene. Attention is also directed to the advisability of including in undergraduate preparation for graduate work in any phase of animal husbandry at least introductory training in French or German and in mathematics.

In the case of students with an unusually thorough training in science who wish to pursue graduate work in some special field of animal husbandry from a non-agricultural viewpoint, the department may waive certain of the above requirements.

Students who desire to become candidates for the doctorate and who register for a minor in the general fields of animal production or the economics of meat production must take Animal Husbandry 7 and 41, if they have not taken these courses or their equivalents during their undergraduate training. Such students registering for a major in these general fields must take in addition Animal Husbandry 31, and most students so majoring will find it desirable to register in Animal Husbandry 35.

Courses for Graduates

103. Experiment Station Problems.—Organization and administration of research; objects, methods, and the sources of error in experimental work. Open to graduate students in all the departments of the College of Agriculture. *Once a week; second semester. One-half unit.* Professor MUMFORD

112. Research.—Investigations along the following lines:

(a) **Economic factors involved in meat production.** Professors RUSK, CARROLL

(b) **Systems of livestock farming.** Professor CASE

(c) **Animal pathology.** Individual research. Professor GRAHAM

(d) **Animal nutrition.** The chemistry of feeding stuffs; metabolism experiments and biochemical studies connected with the nutrition of farm animals. Professor MITCHELL

(e) **Animal genetics.** Individual research course. Associate Professor ROBERTS

(f) **Problems in poultry husbandry.** Professor CARD

One to three times a week; both semesters. One-half to two units. These courses may be taken during the summer by special permission.

117. Animal Genetics.—*Two to three times a week; both semesters. One unit.*
Associate Professor ROBERTS

118. Animal Nutrition Seminar.—A review of current literature in animal nutrition. *Two hours a week; both semesters. One-half unit.* Professor MITCHELL

119. Laboratory Methods in Animal Nutrition.—*Two to five times a week; both semesters. One-half to one unit.* Professor MITCHELL

120. Laboratory Methods in the Diagnosis of Animal Diseases.—*Two to five times a week; both semesters. One-half to one unit.* Professor GRAHAM

121. Laboratory Methods in Animal Genetics.—*Two to five times a week; both semesters. One-half to one unit.* Associate Professor ROBERTS

Courses for Graduates and Advanced Undergraduates

7. Principles of Animal Nutrition.—*Five times a week; first semester.*
Mr. HAMILTON

22. Advanced Stock Judging.—*Five times a week; first semester.*
Members of the department

24. Meat.—*Once a week; first semester.* Associate Professor BULL

25. Beef Production.—*Three times a week; first semester.*
Professor RUSK, Associate Professor SNAPP

26. Pork Production.—*Three times a week; first semester.* Professor CARROLL

27. Sheep Husbandry.—*Twice a week; second semester.*
Assistant Professor KAMMLADE

28. History of Breeds of Live Stock.—*Three times a week; second semester.*
Professor EDMONDS and other members of the department

29. Systems of Live-Stock Farming.—*Twice a week; second semester.*
Associate Professor WILCOX

31. Advanced Course in Animal Nutrition.—*Three times a week; second semester.*
Professor MITCHELL

33. Horse Production.—*Three times a week; second semester.*
Professor EDMONDS, Mr. CRAWFORD

35. Animal Hygiene and Sanitation.—*Twice a week; second semester.*
Professor GRAHAM

39. Poultry Production.—*Three times a week; second semester.* Professor CARD

40. Economics of Poultry Keeping.—*Three times a week; first semester.*
Professor CARD

41. Animal Genetics.—*Three times a week; second semester.*
Associate Professor ROBERTS

ARCHITECTURE AND ARCHITECTURAL ENGINEERING

The prerequisite for graduate work in the Department of Architecture is the equivalent of the undergraduate courses required at the University of Illinois for the Bachelor's Degree in the Department in the branches of the subjects in which registration is desired.

101. Architectural Construction.—Theory and design. *Twice a week; both semesters. One-half to two units.* Professor PALMER

103. Architectural Construction.—Special problems. *Twice a week; both semesters. One-half to two units.* Associate Professor MORGAN

104. Architectural Design.—Advanced course. *Twice a week; both semesters. One to three units.* Professor DEAM

105. Architectural Practice.—Research in special topics. *Once a week; both semesters. One-fourth to one-half unit.* Professor PROVINE

106. Architectural History.—Special research. *Twice a week; both semesters. One-half to two units.* Professor NEWCOMB

ASTRONOMY

The prerequisites for graduate study in astronomy are mathematics through calculus, a year's course in descriptive astronomy, and a course in college physics.

Courses for Graduates

101. Seminar.—*Three times a week; both semesters. One unit.* Professor BAKER

103. Celestial Mechanics.—*Three times a week; both semesters. One unit.* Professor BAKER

Courses for Graduates and Advanced Undergraduates

9. Astrophysics.—*Three times a week; first semester.* Professor BAKER

14. Observational Astronomy.—*Three times a week; both semesters.* Professor BAKER

15. Geodetic Astronomy.—*Three times a week; second semester.* Professor BAKER

BACTERIOLOGY

Students electing bacteriology as a major study must have had at least 10 semester hours of bacteriology and 15 semester hours of some other physical or biological science. Before receiving a degree a student must have had work equivalent to courses 5a, 5b, or 20, 8, 26, 103, and 107; candidates for the doctor's degree will be held responsible for a general knowledge of the subject as applied to plant pathology, dairy husbandry (dairy bacteriology), and soil biology. Courses in these subjects are listed under their respective departments and will be counted, after conference with adviser, toward the requirements for the doctor's degree.

Candidates for the doctor's degree with a major study in some other field than bacteriology, who elect a first or second minor in bacteriology, must offer a minimum of three units for the first minor and two and one-half units for the second minor

selected from the courses offered in this department, or, for satisfactory reasons, certain courses in the departments mentioned above. Some of these courses must be strictly graduate courses. Course 103 is required of candidates for the doctor's degree whether bacteriology is a major or minor study.

Courses for Graduates

103. Physiology of Bacteria.—*Twice a week; first semester. One unit.*
Professor TANNER

107. Research.—For those students who are taking a major in bacteriology either for the doctor's degree or master's degree. *Both semesters. One-half to four units.* Professor TANNER, Dr. WALLACE

118a-118b. Current Literature.—Required of all graduate students majoring in bacteriology. *Once a week; both semesters. One-fourth unit.* Professor TANNER

The attention of students is called also to courses in bacteriology offered in other departments. Certain of these courses must be elected toward requirements for advanced degrees after conference with adviser.

Courses for Graduates and Advanced Undergraduates

8. Food Bacteriology.—Water, sewage, and food bacteria. *Five times a week; second semester.* Professor TANNER and assistant

10. Epidemiology.—*Twice a week; first semester.* Dr. WALLACE

20. General Bacteriology.—For seniors and graduate students. *Five times a week; both semesters.* Professor TANNER, Dr. WALLACE

26. Pathogenic Bacteriology.—*Three times a week; first semester.* Dr. WALLACE

BOTANY

Candidates for advanced degrees in botany must offer for admission at least 20 hours in botany inclusive of 2a or 2b and 3, or 15 hours in botany and 5 hours in a related subject acceptable to the department. Graduate students who desire to elect botany for minor credit must offer 15 hours of botany, or 10 hours of botany and 5 hours in a related subject acceptable to the department.

The department wishes to call the attention of graduate students to courses in agronomy and soils, bacteriology, chemistry, entomology, geography, geology, horticulture, mathematics, physics, physiology, and zoology which are available to advanced students and offer a broad foundation for the different phases of botanical work. The practical work in plant sciences in the College of Agriculture and the Experiment Station offers unusual facilities to the graduate student. Joint majors may be arranged in botany and agronomy.

Courses for Graduates

110. Botanical Discussions.—Required of all students and of members of the instructional staff. *Once a week; both semesters.* No credit.

112. Discussions in Plant Morphology.—*Once a week; both semesters. One-fourth unit.* Professor BUCHHOLZ

113. Discussions in Physiology.—*Once a week; both semesters. One-fourth unit.* Professor HOTTES

117. Discussions in Pathology and Mycology.—*Once a week; both semesters. One-fourth unit.* Professor STEVENS

118. Discussions in Plant Ecology and Plant Geography.—*Once a week; both semesters. One-fourth unit.* Associate Professor VESTAL

Research Courses

120. Embryology of Seed Plants.—*Once or twice a week; both semesters. One-half to two units.* (Botany 112 to be taken concurrently.) Professor BUCHHOLZ

130. Physiology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 113 to be taken concurrently.) Professor HOTTES

155. Plant Geography.—*Once or twice a week; both semesters. One-half to two units.* (Botany 118 to be taken concurrently.) Associate Professor VESTAL

170. Pathology and Mycology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 117 to be taken concurrently.) Professor STEVENS

180. Ecology.—*Once or twice a week; both semesters. One-half to two units.* (Botany 118 to be taken concurrently.) Associate Professor VESTAL

Courses for Graduates and Advanced Undergraduates

20. Cytology.—*Once or twice a week; second semester.* (Given in 1933-34 and in alternate years.) Professor BUCHHOLZ

33. Physiology.—Discussions and experiments on growth, and the effect of environment on growth. *Once or twice a week; first semester.* Professor HOTTES

34. Physiology.—Discussions and experiments on respiration, and the effects of the environment and food on energy release. *Once or twice a week; second semester.* Professor HOTTES

41. Bryophytes.—Morphology and classification. *Once or twice a week; second semester.* (Given in 1932-33 and in alternate years.) Dr. HAGUE

43. Pteridophytes.—Comparative morphology. *Once or twice a week; first semester.* (Given in 1932-33 and in alternate years.) Professor BUCHHOLZ

44. Spermatophytes.—Comparative morphology. *Once or twice a week; second semester.* (Given in 1932-33 and in alternate years.) Professor BUCHHOLZ

45. Histology, Anatomy and Technique.—*Once or twice a week; first semester.* Professor BUCHHOLZ

46. Heredity and Evolution.—The cell in inheritance, environment, adaptation, and evolution. *Once or twice a week; first semester.* (Given in 1933-34 and in alternate years.) Professor BUCHHOLZ

55. Plant Geography of North America.—Regional divisions of North America; climate, soil, topography, vegetation, vegetational history. *Once or twice a week; first semester.* (Given in 1932-33 and in alternate years.) Associate Professor VESTAL

56. Plant Geography of the World.—Regional divisions and vegetation of continents other than North America. *Once or twice a week; first semester.* (Given in 1933-34 and in alternate years.) Associate Professor VESTAL

60. Systematic Botany.—Phylogenetic study of ferns and flowering plants. Relationship of the principal orders and families, rules of taxonomy and the identification of species. *Once or twice a week; first semester.* (Given in 1932-33 and in alternate years.) Professor BUCHHOLZ

70. Taxonomy of Pathogenic Fungi.—Myxomycetes, Bacteria, Phycomycetes and Ascomycetes. *Once or twice a week; first semester.* Professor STEVENS

77. Taxonomy of Pathogenic Fungi.—Basidiomycetes and Fungi Imperfecti. *Once or twice a week; second semester.* Professor STEVENS

79. Methods in Pathology.—A general survey of the special methods used in Plant Pathology. *Once a week; second semester.* (Given in 1932-33 and in alternate years.) Professor STEVENS

80. Ecology.—Analysis of the environmental complex; responses of plants to particular factors. *Once or twice a week; second semester.* (Given in 1932-33 and in alternate years.) Associate Professor VESTAL

88. Ecology.—Plant Communities. The units of vegetation and their composition and changes. *Once or twice a week; second semester.* (Given in 1933-34 and in alternate years.) Associate Professor VESTAL

BUSINESS LAW

Course for Graduates and Advanced Undergraduates

10. Law of Security Relations and Banking.—*Three times a week; either semester.* Associate Professor DILLAVOU

BUSINESS ORGANIZATION AND OPERATION

Work may be done in the field of business organization and operation for a major or a minor for the M.S. degree, and for a minor for the doctorate. To do major work in this field, the student must have completed an undergraduate curriculum equivalent to that of the College of Commerce and Business Administration. To do minor work, he must have had at least five semester hours' credit in the principles of economics, also Business Organization and Operation 1 and 2 or the equivalent. Business Organization and Operation 1 is a prerequisite for 104.

Courses for Graduates

102. Marketing Policies and Problems.—*Twice a week; both semesters. One unit.* Professor CONVERSE

104. Scientific Management.—The history of the scientific management movement; critical study of the proposed systems. *Twice a week; both semesters. One unit.* Associate Professor ANDERSON

107. Sales Campaigns.—*Twice a week; both semesters. One unit.* Professor RUSSELL

129. Thesis.—*Time to be arranged; both semesters. One unit.*
Professor RUSSELL and others

Courses for Graduates and Advanced Undergraduates

3. Retail and Wholesale Store Organization and Operation.—*Three times a week; second semester.* Mr. WHITLO

4. Management in Manufacturing.—*Three times a week; either semester.*
Associate Professor ANDERSON

7. Salesmanship.—*Twice a week; either semester.* Mr. JONES

8. Advertising.—*Three times a week; either semester.* Professor RUSSELL

9. Trade and Civic Organizations.—*Twice a week; second semester.*

17. Sales Management.—*Twice a week; second semester.* Mr. HESLIP

18. Advertising Campaigns.—*Three times a week; second semester.*
Professor RUSSELL

20. Credits and Collections.—*Three times a week; first semester.*
Professor CONVERSE

22. Marketing Policies and Problems.—*Twice a week; second semester.*
Professor CONVERSE

70. Operation of Public Utilities.—*Three times a week; second semester.*

75. Management of Public Utilities.—*Three times a week; first semester.*
Assistant Professor GRAY

CERAMIC ENGINEERING

Graduate work leading to the degrees of Master of Science and Doctor of Philosophy in chemistry (ceramic chemistry), and Master of Science and Doctor of Philosophy in ceramic engineering are offered by the department. Graduate students who wish to elect ceramic chemistry as their major field of study must have had the equivalent of twenty-five semester hours of chemistry and this must include satisfactory courses in general chemistry, qualitative and quantitative analysis, and either physical or organic chemistry. Such students must also have had at least one year of college physics and training in mathematics which includes calculus.

The prerequisites for graduate work in ceramics or ceramic engineering are the equivalents of the undergraduate courses required for the degrees of Bachelor of Science in ceramics or ceramic engineering according to the branch of the subject in which registration is desired.

Candidates for the degree of Doctor of Philosophy with their major field of study in ceramic chemistry must fulfill the same general requirements in chemistry as candidates in other branches of chemistry.

Courses for Graduates

101. The Chemistry of the Compounds of Silicon.—*Twice a week; both semesters. One unit.* Professor PARMELEE

102. General Technology of the Clay Industries.—*Both semesters. One to two units.* Professors PARMELEE, HURSH, Associate Professor ANDREWS

103. Chemistry of Silicates.—Laboratory to supplement Ceramic Engineering 101, which must precede or accompany it. *Second semester. One to two units.* Professor PARMELEE

104. Technology of Glass.—*Second semester. One to two units.* Professor PARMELEE

105. Methods of Ceramic Research.—*Once a week; second semester. One unit.* Professor PARMELEE

106. Research.—Professors PARMELEE, HURSH, Associate Professor ANDREWS

Courses for Graduates and Advanced Undergraduates

5. Ceramic Bodies.—*Five times a week; first semester.* Professor PARMELEE

7. Structural Clay Products.—*Three times a week; first semester.* Associate Professor ANDREWS

8. Glass Technology.—*Twice a week; second semester.* Professor PARMELEE

10. Cements.—*Three times a week; second semester.* Associate Professor ANDREWS

11. Drying Clay Products.—*Three times a week; second semester.* Professor HURSH

14. Glasses and Glazes.—*Three times a week; second semester.* Professor PARMELEE

16. Enamels.—*Three times a week; first semester.* Associate Professor ANDREWS

18. Ceramic Microscopy.—*Three times a week; first semester.* Mr. THOMPSON

20. Refractory Materials.—*Twice a week; second semester.* Professor HURSH

22. Kilns and the Burning of Clay Products.—*Three times a week; first semester.* Professor HURSH

23. Dryer and Kiln Design.—*Twice a week; first semester.* Professor HURSH

24. Ceramic Engineering Design.—*Three times a week; second semester.* Professor HURSH

28. Pyrochemical Problems.—*Twice a week; second semester.* Associate Professor ANDREWS

CHEMISTRY

Graduate students whose major subject is in some department other than chemistry, before taking graduate work for credit in this department, must have had the equivalent of 15 university credits in chemistry, and the ground covered should include satisfactory work in general chemistry and in qualitative and quantitative analysis and elementary organic chemistry. Such students are advised to make selections from the following courses: Chemistry 40, 41, 42, 43, 27, 36b and 37b, 50a, 60a, 15a, 16a and 97b. Courses of a more special nature will not as a rule be accepted for

graduate work unless preceded by one of the courses above. Graduate students who are candidates for an advanced degree in chemistry must have had the equivalent of 25 university credits in chemistry properly distributed.

Graduate students whose major subject is in some department other than chemistry and who intend to take a first minor in chemistry or any branch of chemistry toward the Ph.D. degree must include among the courses taken, Chemistry 40 and 41, or must have had the equivalent.

Graduate students who are candidates for the A.M. or M.S. degree in chemistry must include in the courses taken Chemistry 40 and 41 or must have had the equivalent. Graduate students who are candidates for the Ph.D. degree in any branch of chemistry must include among their courses Chemistry 40, 41, 42, and 43 or must have had the equivalent.

Students who intend to take graduate work in chemistry should include in their undergraduate preparation at least the equivalent of one full year of physics, one year of French, one year of German, mathematics through differential and integral calculus. Any student without these subjects may enter the Graduate School but will be required to spend part of his time in residence on the above-mentioned subjects.

Courses for Graduates

INORGANIC CHEMISTRY

101a-101b. Inorganic Chemistry.—The less familiar elements and their relationship in the periodic system. Lectures; recitations. *Twice a week; both semesters. One-half unit.* Professor HOPKINS

102a-102b. Inorganic Chemistry.—(Laboratory.) Inorganic preparations and qualitative analysis of the less familiar elements. To accompany or follow Chemistry 101a-101b. *One to three times a week; both semesters. One-fourth to three-fourths unit.* Professor HOPKINS

105a-105b. Inorganic Chemistry.—(Seminar and Special Topics.) Current literature; special topic for 1932-33: First semester, Non-aqueous Solvents (Dr. AUDRIETH). *One, two, or three times a week; both semesters. One-fourth to one unit.* Professor HOPKINS

QUALITATIVE AND QUANTITATIVE ANALYSIS

123a. Qualitative Analysis.—The principles and methods of analytical chemistry; theory of solutions. Lectures; with or without laboratory. *Twice a week; first semester. One-half to one and one-fourth unit.* Associate Professor REEDY

124b. Quantitative Analysis.—A modern survey of advanced principles, calculations, experimental methods and applications. Lectures, with or without laboratory. *Twice a week; second semester. One-half to one and one-fourth units.* Associate Professor REEDY

125a-125b. Quantitative Analysis.—(Seminar.) Special topics in analytical chemistry. (Required of all students taking a major or minor in analytical chemistry.) *One to three times a week; both semesters. One-fourth to one unit.* Professor CLARK

126a. Quantitative Analysis.—(Selected topics in quantitative organic chemistry.) Critical survey of methods of analysis for elementary constituents, application

of polarimetry, refractometry, microscopy, optical spectroscopy, spectrophotometry and other instrumental methods. Lectures, laboratory work. *Two to five times a week; first semester. One-half to one and one-fourth units.*

Professor CLARK, Assistant Professor ENGLIS

127a-127b. Modern Applications of Radiation in Chemical and Industrial Problems.—(X-rays, radioactivity.) *Twice a week; both semesters. One-half to one unit.* Professor CLARK

ORGANIC CHEMISTRY

132a. Organic Chemistry.—(First course.) Review of the general reactions in organic chemistry: Problems. *Twice a week; first semester. Three-fourths unit.* Associate Professor SHRINER

133b. Organic Chemistry.—Optical isomerism; geometric isomerism; tautomerism, etc. *Twice a week; second semester. Three-fourths unit.* Professor ADAMS

134. Organic Chemistry.—(Laboratory.) Advanced preparations are selected to meet the needs of each individual in the course. *Two to four times a week; both semesters. One-half to one unit.* Professor MARVEL, Associate Professor FUSON

135a-135b. Organic Chemistry.—(Seminar.) Current literature. (Required of all students majoring in organic chemistry.) *Once a week; both semesters. One-fourth unit.* Professor ADAMS

136a. Organic Chemistry.—Special topics. *Twice a week; first semester. Three-fourths unit.* Professor MARVEL

PHYSICAL CHEMISTRY

145a-145b. Physical Chemistry.—(Seminar.) Recent development in physical chemistry. *Twice a week; both semesters. Three-fourths unit.*

Professor RODEBUSH and staff

PHYSIOLOGICAL CHEMISTRY

150b. Physiological Chemistry.—Chemistry of intermediary metabolism. Lectures; discussions; readings. *Twice a week; second semester. Three-fourths unit.* Professor ROSE

152a-152b. Physiological Chemistry.—Difficult biochemical preparations; analytical methods; chiefly laboratory. *One to five times a week; both semesters. One-half to one unit.* Professor ROSE

155a-155b. Physiological Chemistry.—(Seminar.) Current literature. (Required of all students majoring in physiological chemistry.) *Twice a week; both semesters. Three-fourths unit.* Professor ROSE

INDUSTRIAL CHEMISTRY

160a-160b. Advanced Chemical Technology, and Chemical Engineering.—Recent developments in the chemical industry. Lectures. *Twice a week; both semesters. One-half unit.* Professor KEYES

161a-161b. Chemical Plant Design.—Calculations and layout of equipment for recently developed processes. *Twice a week; both semesters. One-half unit.*

Associate Professor KRASE

SANITARY CHEMISTRY

186a-186b. Sanitary Chemistry.—Special problems and new developments in sanitary chemistry. *Twice a week; both semesters. One-half to one and one-fourth units.* Professor BUSWELL

MISCELLANEOUS

190a-190b. Research.—A thesis is usually required of students taking the master's degree and is always required of students taking the degree of Doctor of Philosophy. *Both semesters.* Work may be taken in the following subjects:

Physical and Electrochemistry—Professor RODEBUSH, Associate Professor PHIPPS, Dr. COPLEY

Inorganic Chemistry—Professor HOPKINS, Associate Professor REEDY, Drs. AUDRIETH, BAILAR, STILLWELL, COPLEY, QUILL

Analytical Chemistry—Professor CLARK, Associate Professor REEDY, Assistant Professors ENGLIS, SMITH

X-ray Chemistry—Professor CLARK, Dr. STILLWELL

Food Chemistry—Assistant Professor ENGLIS

Phyto-Chemistry—Assistant Professor ENGLIS

Organic Chemistry—Professors ADAMS, MARVEL, Associate Professors FUSON, SHRINER, Dr. BAILAR

Sanitary Chemistry—Professor BUSWELL

Zymo-Chemistry—Professor BUSWELL

Physiological Chemistry—Professor ROSE

Industrial Chemistry—Professor KEYES, Associate Professor KRASE, Assistant Professor KISTLER

Ceramic Chemistry—Professor PARMELEE

Courses for Graduates and Advanced Undergraduates

INORGANIC CHEMISTRY

15a. Inorganic Chemistry.—The common elements; periodic relationship; preparation and application of the common elements and compounds. Lectures; recitations. *Twice a week; first semester.* Dr. BAILAR

16a. Inorganic Chemistry.—(Laboratory.) Preparation of the less easily produced inorganic compounds. *Twice a week; first semester.* Dr. BAILAR

QUALITATIVE AND QUANTITATIVE ANALYSIS

27. Quantitative Analysis.—Special methods and instruments; gas analysis, electrometric titration, colorimetry, and other advanced analyses. *Four times a week; both semesters.* Assistant Professor SMITH

ORGANIC CHEMISTRY

36b. Organic Chemistry.—(Second course.) *Three times a week; second semester.* Professor MARVEL

37b. Organic Chemistry.—(Laboratory.) (Second course.) Organic synthesis. To accompany 36b. *Twice a week; second semester.* Associate Professor FUSON

38a. Qualitative Organic Analysis.—Identification of pure organic compounds and mixtures. *Twice a week; first semester.* Associate Professor FUSON

PHYSICAL CHEMISTRY

40. Elementary Physical Chemistry.—*Three times a week; both semesters.* Professor RODEBUSH, Associate Professor PHIPPS

41. Elementary Physical Chemistry.—(Laboratory.) To accompany Chemistry 40. *Once a week; both semesters.* Professor RODEBUSH, Associate Professor PHIPPS and assistants

42. Elementary Physical Chemistry.—*Three times a week; both semesters.* Associate Professor PHIPPS

43. Elementary Physical Chemistry.—(Laboratory.) *Once a week; both semesters.* Associate Professor PHIPPS and assistants

44a-44b. Advanced Physical Chemistry.—Thermodynamics and free energy calculations. Atomic structure. *Twice a week; both semesters.* Professor RODEBUSH, Associate Professor PHIPPS

49b. Chemistry of Colloids.—Preparation and properties of colloids. Special apparatus and technique employed in colloid chemistry. *Three times a week; second semester.* Professor BUSWELL

PHYSIOLOGICAL CHEMISTRY

50a. Physiological Chemistry.—Proteins, fats, and carbohydrates; tissues, digestion, intestinal putrefaction, and feces; quantitative analysis of gastric contents, blood. milk, and urine. Lectures; laboratory. *Five times a week; first semester.* Professor ROSE and assistants

51b. Problems of Metabolism.—Micro-methods of blood and urine analysis, and their application. Lectures; laboratory. *Three times a week; second semester.*

INDUSTRIAL CHEMISTRY

60a. Chemical Technology.—The survey of important processes and recent developments in the chemical industry; inspection trip. (Estimated cost of this trip is $30 to $35 per student.) Laboratory. *Four times a week; first semester.* Assistant Professor KISTLER

61a-61b. Principles of Chemical Engineering.—The application of scientific principles to the unit operations of chemical engineering. Lectures; laboratory. *Four times a week; both semesters.* Associate Professor KRASE, Assistant Professor KISTLER, Mr. HOWARD

62a-62b. Principles of Research and Development.—The fundamental methods used in the research and development departments in chemical industry; also economic problems. *Twice a week; both semesters.* Professor KEYES

63b. Fuels and Their Combustion.—*Three times a week; second semester.* Mr. HOWARD

65b. Industrial Stoichiometry.—Chemical engineering calculations. *Three times a week; second semester.* Assistant Professor KISTLER

67a-67b. Evaporation.—The theory, design and control of commercial evaporative equipment. *Twice a week; both semesters.* Associate Professor KRASE

68a. Mechanical Separation.—Equipment for the mechanical separation of solids, liquids and gases. Theory and calculations. *Twice a week; first semester.* Associate Professor KRASE

69b. Flow of Gases and Liquids.—Fundamental theory and application. The design of measuring devices and other equipment. *Twice a week; second semester.* Associate Professor KRASE

70b. Humidification and Drying.—Calculations and mathematical studies of humidifiers and driers. *Twice a week; second semester.* Mr. HOWARD

71a. Sampling, Grinding and Mixing.—Fundamental principles involved and mathematical calculations. *Once a week; first semester.* Mr. HOWARD

72b. Distillation.—Calculations in the operation and design of distillation equipment. *Twice a week; second semester.* Mr. HOWARD

73a. Metallurgy.—Manufacture of iron and steel. *Three times a week; first semester.* Mr. HOWARD

74b. Metallurgy and Metallography.—General metallurgy of iron and steel; physical characteristics and microstructure of metals and alloys. Lectures; laboratory. *Three times a week; second semester.* Mr. HOWARD

SANITARY CHEMISTRY

86a. Chemistry of Sanitation.—Lectures, demonstrations, and field trips covering the field of water purification, sewage treatment, and general sanitation. *Three times a week; first semester.* Professor BUSWELL

MISCELLANEOUS COURSES

92a. Chemical Literature and Reference Work.—*Once a week; first semester.* Dr. BARTOW

95a. History of Science with Particular Reference to Chemistry.—Lectures; reading. *Twice a week; first semester.* Dr. BARTOW

97b. Food Analysis.—Quantitative organic analysis of food products; alcohols, carbohydrates, fats and oils, cereals, nitrogenous bodies, preservatives, and colors. *Six times a week; second semester.* Assistant Professor ENGLIS

CIVIL ENGINEERING

The prerequisite for graduate work in civil engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in civil engineering in the branches of the subject in which registration is desired.[1]

[1]Courses offered to junior and senior students are open for minor credit to students majoring in other fields.

Courses for Graduates

101. Water Supply.—*Twice a week; first semester. One unit.* Professor BABBITT

102. Sewerage.—*Twice a week; second semester. One unit.* Professor BABBITT

103. Highway Engineering.—*Twice a week; first semester. One unit.* Professor CRANDELL

104. Municipal Engineering.—*Twice a week; second semester. One unit.* Professor CRANDELL

105. Reinforced Concrete Theory.—*Twice a week; first semester. One unit.* Professor CROSS

106. Reinforced Concrete Structures.—*Twice a week; first semester. One unit.* Professor CROSS

107. Statically Indeterminate Structures and Secondary Stresses.—*Twice a week; first semester. One unit.* Professor HUNTINGTON

108. Bridge Design.—*Twice a week; second semester. One or two units.* Professor CROSS

109. Water Purification and General Sanitation.—*Twice a week; first semester. One unit.* Professor BABBITT

110. Sewage Disposal, Wastes Disposal, and General Sanitation.—*Twice a week; second semester. One unit.* Professor BABBITT

112. Masonry Construction and Foundations.—*Twice a week; second semester. One unit.* Professor HUNTINGTON

124. Steel Building Design.—*Twice a week; first semester. One unit.* Professor HUNTINGTON

125. Design of Industrial Structures.—*Twice a week; second semester. One unit.* Dean KETCHUM

130. Hydrology.—*Twice a week; first or second semester. One unit.* Professor PICKELS

131. Water Power.—*Twice a week; second semester. One unit.* Associate Professor DOLAND

140. Research.—*First or second semester. One-half to two units.* Members of the department

Courses for Graduates and Advanced Undergraduates

67. Statically Indeterminate Structures.—The elastic theory and its applications in statically indeterminate structures. *Three times a week; first semester.* Professor CROSS

68. Statically Indeterminate Structures.—A continuation of course 67. *Three times a week; second semester.* Professor CROSS

See also Mechanics, Theoretical and Applied, and Railway Engineering.

THE CLASSICS

The Degree of Master of Arts in the Classics.—The major may be either Latin or Greek.

The Degree of Doctor of Philosophy in the Classics.—The degree is given in classical philology. Major work may be taken in either Latin or Greek, but whichever language is taken as a major, the other must be taken as a first minor.

GREEK

Preparation for first-year graduate work in Greek must include at least two years of preparatory Greek, two years of college Greek, and two years of college Latin. A reading knowledge of French and German is important for candidates in this subject. The study of history and philosophy is especially recommended.

Courses for Graduates

104. Homer and Homeric Civilization.—*Twice a week; second semester. One unit.*
Dr. MYLONAS

106a. Greek Drama, Tragedy.—*Twice a week; second semester. One unit.*
Associate Professor PERRY

110. Bibliography and Criticism.—(Thesis course; the same as Latin 110). *Once a week; both semesters. One unit.*
Professors OLDFATHER, CANTER, Associate Professor PERRY

121. Thucydides.—*Twice a week; first semester. One unit.*
Associate Professor PERRY

Courses for Graduates and Advanced Undergraduates

5. Herodotus and Lyric Poets.—*Three times a week; first semester.* Dr. MYLONAS

7. Greek Drama: Tragedy and Comedy.—*Three times a week; second semester.*
Dr. MYLONAS

14. Greek Composition.—*Once a week; second semester.*
Associate Professor PERRY

18. Greek Archaeology.—*Twice a week; first semester.* Dr. MYLONAS

LATIN

Preparation for first-year graduate work in Latin must include at least two years of preparatory Latin and four years of college Latin. A reading knowledge of French and German is important. Some acquaintance with Greek is highly desirable, and the study of history and philosophy is especially recommended.

Courses for Graduates

101. Roman Epigram.—*Twice a week; second semester. One unit.*
Professor CANTER

102. Roman Oratory.—*Twice a week; first semester. One unit.*
Professor CANTER

104. Latin Palaeography.—*Twice a week; first semester. One unit.*
Professor OLDFATHER

107. Latin Epigraphy.—*Twice a week; second semester. One unit.* (Not given 1932-33.) Professor CANTER

110. Bibliography and Criticism.—(Thesis course; the same as Greek 110.) *Once a week; both semesters. One unit.*
Professors OLDFATHER, CANTER, Associate Professor PERRY

114. Caesar.—*Twice a week; second semester. One unit.* Professor OLDFATHER

115. Latin Elegy.—*Twice a week; first semester. One unit.* (Not given 1932-33.)
Professor CANTER

117. Lucretius.—*Twice a week; first semester. One unit.* (Not given 1932-33.)
Associate Professor PERRY

Courses for Graduates and Advanced Undergraduates

18. Roman Archaeology.—*Twice a week; second semester.* Dr. MYLONAS

23. Livy, Tibullus, and Propertius.—*Three times a week; first semester.*
Professor CANTER

24. Ovid (*Elegy*) **and Seneca** (*Epistles* and *Tragedies*).—*Three times a week; second semester.* Professor CANTER

10. Composition.—*Twice a week; second semester.* Associate Professor PERRY

DAIRY HUSBANDRY

The graduate student may major in dairy husbandry for the degree of Master of Science or Doctor of Philosophy.

Candidates for advanced degrees in dairy husbandry must have had adequate training in collegiate courses in dairy husbandry. In addition, depending upon his field of specialization, the student should have had courses in the following subjects: chemistry, bacteriology, physics, economics, zoology, genetics and mathematics.

For either degree a first minor must be taken outside the department, preferably outside the college. If a second minor is elected it may with proper approval be chosen in the department.

Courses for Graduates

101. Economic Milk Production.—*Twice a week; both semesters. One-half to two units.* Professor FRASER

104. Dairy Bacteriology.—Fermentation in dairy products. *Both semesters. One-half to one unit.* Professor PRUCHA

105. Dairy Manufactures.—*Both semesters. One-half to two units.*
Professor RUEHE, Associate Professor TRACY

106. Dairy Bacteriology.—Research on assigned problems. *Both semesters. One-half to two units.* Professor PRUCHA

107. Dairy Chemistry.—Assigned problems. *Both semesters. One-half to two units.* Assistant Professor OVERMAN

108. Physiology of Lactation.—*Once a week; both semesters. One-half to two units.*
Professor GAINES

112. Research.—*Both semesters. One to four units.* Special problems along the following lines:

(a) Dairy Bacteriology. Professor PRUCHA

(b) Dairy Chemistry. Assistant Professor OVERMAN

(c) Dairy Cattle Breeding. Professor YAPP

(d) Dairy Cattle Feeding. Associate Professor NEVENS

(e) Milk Production. Professor GAINES

(f) Dairy Manufactures. Professor RUEHE, Associate Professor TRACY

NOTE: Graduate students writing a thesis should so indicate in registering in Dairy Husbandry 112.

Courses for Graduates and Advanced Undergraduates

4. Ice Cream Making.—*Four times a week; first semester.*
Associate Professor TRACY

5. Composition of Dairy Products.—*Three times a week; second semester.*
Assistant Professor OVERMAN

7. Creamery Buttermaking and Factory Management.—*Five times a week; second semester.* Professor RUEHE, Mr. TUCKEY

10. Dairy Bacteriology.—*Three times a week; first semester.*
Professor PRUCHA, Assistant Professor BRANNON

14. Milk Condensing.—*Three times a week; second semester.*
Associate Professor TRACY

17. Advanced Study of Dairy Breeds.—*Three times a week; first semester.*
Professor YAPP

20. Economic Problems in Dairy Farming.—*Three times a week; first semester.*
Professor FRASER

21. Systems of Dairy Farming.—*Three times a week; second semester.*
Professor FRASER

25. Advanced Dairy Cattle Feeding.—*Twice a week; first semester.*
Associate Professor NEVENS

26. Marketing Dairy Products.—*Twice a week; second semester.* Mr. BROWN

ECONOMICS

Every student entering on major graduate work in economics must have had a course in the principles of the science and also in some special part of the field such as public finance or money and banking. The work must represent at least eight semester hours. He must have had at least one semester's work in English, American or general European history; and at least three hours in political science.

Those who take the subject as a minor must have had a course of at least five semester hours in the principles.

Graduate students who are making economics their major are required during their first year to acquaint themselves with the works of the masters in the science, by taking either course 101 or 103. In the same or subsequent year they are expected to elect the fundamental courses in some other divisions of the field of economics, as indicated by the divisions listed in the Economic Seminar, course 118. One of the minors for the doctor's degree may be taken in a separate division of economics; the other must be taken out of the department, and preferably outside of the College of Commerce.

The following courses may be taken by students in general economics for major or minor credit; all numbered above 100; 4, 10, 11, 13, 14, 15, 17, 24, 25, 29, 30, 41, 42, 43, 44, 51, 52, 55, 61, 71, 72, 81. The following may be taken for minor credit only: 8, 9, 31, 36, 56, 82.

Two units will be accepted for a first minor for the master's degree; and four two- or three-hour graduate courses, or their equivalent in advanced undergraduate courses, for a first minor for the doctor's degree.

Courses in transportation may be included in their programs by students of economics as part of their major; courses in transportation, accountancy, and business organization and operation may be used to satisfy the requirements for the minor. See Business Organization and Operation, Transportation, and Agricultural Economics.

Courses for Graduates

101. Economic Theory.—*Three times a week; both semesters. One unit.*
Professor WESTON

102. Theory and History of Money, Credit, and Prices.—*Twice a week; both semesters. One unit.* Assistant Professor WASSERMAN

103. The Distribution of Wealth.—*Twice a week; both semesters. One unit.*
Professor WESTON

104a. Theories and Policies of International Trade.—*Twice a week; first semester. One unit.* Professor LITMAN

104b. Methods and Practices of International Trade.—*Twice a week; second semester. One unit.* Professor LITMAN

105. Public Finance.—*Twice a week; both semesters. One unit.*
Professor HUNTER

106. International Exchange and the Money Markets.—*Twice a week; second semester. One unit.* Associate Professor WRIGHT

107. The Corporation in Economic Evolution.—*Twice a week; both semesters. One unit.* Assistant Professor BROWN

109. Comparison of the Theory and Practice of the Leading Central and Reserve Banks with Special Reference to England, Germany, France, and the United States.—*Twice a week; first semester. One unit.* Associate Professor WRIGHT

110a. Finance and Investments: Fundamental Principles Applied to Business Units of a Simple Character.—*Twice a week; both semesters. One unit.*
Professor ROBINSON

112. Labor Problems.—*Twice a week; both semesters. One unit.*
Associate Professor BERMAN

Arranged in a two-year cycle:

1932-33: Social aspects of Labor; *both semesters.*

1933-34: *First semester*, Trade Unionism; *second semester*, Labor and the Law.

118. Seminar.—Thesis course. (All graduate students writing theses in economics must register in Economics 118; registration for other students is optional.)

(a) **Third Year:** Seminar. Professor WESTON

(b) **First Year:** General Economics. Assistant Professor BROWN

(d) **First Year:** Public Utilities. Assistant Professor GRAY

120. History of Economic Thought.—*Twice a week; both semesters. One unit.*
Professor WESTON

123. Industrial and Financial Organization of Society.—*Twice a week; both semesters. One unit.* Professor LEE

124. International Finance.—*Twice a week; both semesters. One unit.*
Professor BOGART

143. The Administration of Industrial Relations.—*Twice a week; both semesters. One unit.* Dr. HELBING

144. Business Cycles.—*Twice a week; both semesters. One unit.*
Assistant Professor DICKINSON

180. Management of Public Utilities.—*Twice a week; both semesters. One unit.*
Assistant Professor GRAY

See also MATHEMATICS 129.—**Theory of Statistics.**

Courses for Graduates and Advanced Undergraduates

4. History of Money and Banking Institutions, with Particular Reference to the United States.—*Three times a week; first semester.* Professor LEE

8. Foreign Exchange and the Money Market.—*Three times a week; second semester.* Associate Professor WRIGHT

9. Advanced Theory and Practice of Banking.—*Three times a week; first semester.*
Associate Professor WRIGHT

10. Corporation Finance and Management.—*Three times a week; second semester.*
Professor ROBINSON

11. Industrial Consolidation.—Development; plans for controlling trusts. *Three times a week; first semester.* Professor ROBINSON

23. Economic Problems.—*Three times a week; second semester.* Professor LEE

24. Economic Development of Modern Europe.—*Three times a week; second semester.* Professor BOGART

25. Economic History of England.—*Three times a week; first semester.*
Professor BOGART

29. International Commerce and Commercial Policies.—*Three times a week; second semester.* Professor LITMAN

30. World Markets.—*Three times a week; second semester.* Professor LITMAN

31. Organization of International Commerce.—*Three times a week; first semester.*
Professor LITMAN

35. Corporation Finance.—*Three times a week; first semester.* Mr. GREEN

36. Investments.—*Three times a week; second semester.* Professor ROBINSON

41. Labor Problems.—*Three times a week; first semester.*
Associate Professor BERMAN

42. Trade Unionism.—*Three times a week; second semester.*
Associate Professor BERMAN

43. Personnel Administration.—*Three times a week; second semester.*
Dr. HELBING

44. Socialism and Economic Reform.—*Three times a week; first semester.*
Dr. HELBING

51. Public Finance.—*Three times a week; first semester.* Professor HUNTER

52. Problems in Taxation, with Special Reference to Illinois.—*Three times a week; second semester.* Professor HUNTER

55. Economics of Insurance (Life).—*Three times a week; first semester.*
Assistant Professor DICKINSON

56. Economics of Insurance (Property).—*Three times a week; second semester.*
Assistant Professor DICKINSON

58. Urban Land Economics.—*Three times a week; first semester.*
Assistant Professor DICKINSON

61. Economic Theory.—*Three times a week; both semesters.*
Assistant Professor WASSERMAN

71. Economic Statistics.—*Three times a week; first semester.*
Assistant Professor DICKINSON

72. Economic Statistics (Business Barometers).—*Three times a week; second semester.* Assistant Professor DICKINSON

81. Principles of Public Utilities.—*Three times a week; first semester.*
Assistant Professor GRAY

82. Regulation of Public Utilities.—*Twice a week; second semester.*
Associate Professor DILLAVOU

83. Public Utility Rates.—*Three times a week; second semester.*
Assistant Professor GRAY

EDUCATION

For a master's degree in education, Education 125 is required. For students who have not taken a course in the history of education as undergraduates, Education 11 or Education 30 is required.

Education 6 and 25, or their equivalents, are required as prerequisites for all graduate courses.

Courses for Graduates

101. Educational Theory.—*Twice a week; second semester. One unit.*
Professor CAMERON

102. Research in History of American Education.—*Once a week; two hours; both semesters. One unit.* Professor SEYBOLT

104. Educational Administration.—*Twice a week; first semester. One unit.*
Associate Professor WEBER

106. High-School Administration.—*Once a week; two hours; first semester. One unit.* Professor CLEMENT

110. Methods of Teaching.—*Once a week; two hours; first semester. One unit.*
Professor MONROE

119. Curriculum Construction.—*Once a week; two hours; second semester. One unit.* Professor MONROE

120a. Supervision of Secondary Education.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

121. Educational Measurement.—*Once a week; two hours; second semester. One unit.* Associate Professor ODELL

123. Educational Statistics.—*Once a week; two hours; first semester. One unit.*
Associate Professor ODELL

124. Readings in Educational Research.—*Once a week; two hours; both semesters. One unit.* Professor MONROE

125. Educational Psychology.—*Once a week; two hours; first semester. One unit.*
Professor CAMERON

127. High-School Curricula.—*Once a week; two hours; first semester. One unit.*
Professor CLEMENT

129. The Junior College.—*Once a week; two hours; second semester. One unit.*
Professor CLEMENT

131. Analysis and Evaluation of High-School Texts.—*Once a week; two hours; second semester. One unit.* Professor CLEMENT

133. Studies in Secondary Education.—*Once a week; two hours; first semester. One unit.* (Not offered 1932-33.) Professor CLEMENT

141. Problems in the Teaching of English in the Secondary School.—*Once a week; two hours; both semesters. One unit.* Professor PAUL

147. Psychology of Elementary School Subjects.—*Twice a week; first semester. One unit.* Professor CAMERON

150. Thesis.—*Both semesters. One or two units.* Dean BENNER and others

164. Public School Finance.—*Once a week; two hours; second semester. One unit.*
Associate Professor WEBER

165. School Surveys.—*Once a week; two hours; first semester. One unit.*
Associate Professor ODELL

170. Public School Business Administration.—*Once a week; two hours; second semester. One unit.* Associate Professor WEBER

184. Seminar in School Administration.—*Once a week; two hours; second semester. One unit.* Associate Professor WEBER

185. Seminar in Educational Psychology.—*Once a week; two hours; second semester. One unit.* Professor CAMERON

186. Seminar in Secondary Education.—*Once a week; two hours; both semesters. One unit.* Professor CLEMENT

190. Seminar in Educational Research.—*Once a week; two hours; second semester. One unit.* Dean BENNER and others

Courses for Graduates and Advanced Undergraduates

4. Educational Administration.—*Three times a week; first semester.*
Associate Professor WEBER

9. Child Psychology.—*Three times a week; first semester.*
Associate Professor GRIFFITH

11. Ancient and Medieval Education.—*Twice a week; first semester.*
Professor SEYBOLT

18. Educational Measurements.—*Three times a week; both semesters.*
Associate Professor ODELL

20a. Supervision of Secondary Education.—*Twice a week; first semester.*
Professor CLEMENT

21. Supervision of Elementary Education.—*Three times a week; first semester.*
Mr. BROWNE

26. The Junior High School.—*Twice a week; second semester.*
Professor CLEMENT

27. High-School Curricula.—*Twice a week; second semester.* Professor CLEMENT

30. History of American Education.—*Twice a week; second semester.*
Professor SEYBOLT

41. Vocational Education.—*Three times a week; first semester.* Professor MAYS

42. Special Education.—*Twice a week; first semester.*
Assistant Professor DOLCH

43. Mental Tests.—*Three times a week; second semester.* Professor CAMERON

44. Educational Psychology.—(Laboratory course.) *Three times a week; first semester.* Professor CAMERON

45. Psychology of Learning.—*Three times a week; first semester.* Associate Professor GRIFFITH

49. Principles of Intellectual Development.—*Three times a week; second semester.* Associate Professor GRIFFITH

53. Problems of Industrial Education.—*Three times a week; both semesters.* Professor MAYS

54. Functions and Methods of the Part-time School.—*Twice a week; first semester.* Professor MAYS

54a. Curriculum and Administration of the Part-time School.—*Twice a week; second semester.* Professor MAYS

55. Vocational Guidance.—*Three times a week; first semester.* Professor MAYS

ELECTRICAL ENGINEERING

The prerequisite for graduate work in electrical engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in electrical engineering in the branches of the subject in which registration is desired.

Graduate students who wish to take a minor in electrical engineering must have had differential and integral calculus, and one year's work in college physics.

Courses for Graduates[1]

101. Alternating Currents.—The theory of transient phenomena; polyphase circuits; measuring apparatus. *Twice a week; both semesters. One and one-half units.* Professor PAINE, Assistant Professor REICH

102. Electric Waves and Oscillations.—*Twice a week; both semesters. One-half to one unit.* Assistant Professor REICH

103. Electrical Designs.—*Twice a week; second semester. One unit.* Associate Professor WALDO

104. Vacuum Tubes and Control Devices.—*Three times a week; both semesters. One unit.* Assistant Professor REICH

105. Research.—*Twice a week; both semesters. One to three units.* Professors PAINE, TYKOCINER, Assistant Professors BROWN, REICH

ENGLISH LANGUAGE AND LITERATURE

Students who enter on graduate work with English as their major subject are required to give evidence of their ability to write good English. They must present the equivalent of fourteen hours of undergraduate work in English literature, the required college work in rhetoric, and the equivalent of four semesters of college work in Latin, or in Greek, or in French, or in German. After the first year of graduate work a knowledge of French and German is indispensable.

[1]Courses offered to junior and senior students are open for minor credit to students majoring in other departments.

Students making English their minor may be admitted to such courses as in the judgment of the instructor in charge they are qualified to pursue.

The Degree of Master of Arts in English.—In addition to complying with the general rules of the Graduate School, candidates for the degree of Master of Arts in English must comply with the following rules of the Department of English: (1) They must choose a portion of their work from the group of courses described as "for graduates;" (2) must offer an elementary course in Anglo-Saxon; and (3) must take besides the regular semester examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Master of Arts in Public Speaking.—Candidates for the degree of Master of Arts in public speaking must comply with the following regulations: (1) They must satisfy the general requirements of the Department of English for admission to graduate work; (2) must offer a minor in English of not less than two units selected from the 100 courses in English literature; (3) must take, besides the regular examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Doctor of Philosophy in English.—Candidates for the degree of Doctor of Philosophy in English may expect to be examined on the entire field of the English language and literature. They are urged, furthermore, to acquaint themselves as fully as possible with the history and philosophy of the period in which their main interest lies, and with the foreign languages and literature most closely related to English and that period.

Courses for Graduates

101. Research in Special Topics.—*One or two units.*
Professors Graham, Bernbaum, Flom, Paul, Zeitlin, E. C. Baldwin, T. W. Baldwin, Jones, Hillebrand, Jefferson; Associate Professors Sandford, Parry, Fletcher; Assistant Professors Rinaker, Secord, Finney.

111. Caedmon and Cynewulf.—*Twice a week; first semester. One unit.*
Professor Jones

114. The Development of the Essay.—The English essay; classical origins; continental influences. *Twice a week; both semesters. One unit.* Professor Zeitlin

121. History of Rhetorical Theory, II.—*Twice a week; first semester. One unit.*
Associate Professor Sandford

129. English Literature from the Norman Conquest to 1400.—*Twice a week; both semesters. One unit.* Professor Jones

130. Tragedy.—*Twice a week; both semesters. One unit.* Professor Hillebrand

135. Problems in American Literature.—*Twice a week; both semesters. One unit.*
Professor Paul

137. Prose Writers of the Nineteenth Century.—*Twice a week; first semester. One unit.* (Not given 1932-33.) Professor Zeitlin

138. The Romantic Movement.—*Twice a week; both semesters. One unit.* (To receive credit, a student must take both semesters.) Professor Bernbaum

140. Investigations in Modern English Literature.—(For second-year and third-year graduate students who are preparing theses for the doctor's degree.) *Once a week; three hours; both semesters. One to three units.* (May be taken in successive years.)
Professor BERNBAUM

141. Literature of the Seventeenth Century.—*Twice a week; both semesters. One unit.*
Professor E. C. BALDWIN

143. History and Theory of Prose Fiction.—*Once a week; two hours; both semesters. One unit.* (To receive credit, a student must take both semesters.)
Professor BERNBAUM

145. Studies in Eighteenth Century Literature.—*Twice a week; both semesters. One unit.*
Professor GRAHAM

147. Shakespeare and Elizabethan Drama.—Critical study of the chief plays. *Twice a week; both semesters. One unit.*
Professor T. W. BALDWIN

148. Seminar in Elizabethan Drama.—*Twice a week; first semester. One unit.*
Professor T. W. BALDWIN

149. The Development of Tudor Drama.—*Twice a week; both semesters.*
Professor T. W. BALDWIN

151. The Literature of Travel and Biography in Relation to Prose Fiction.—*Twice a week; second semester. One unit.*
Assistant Professor SECORD

153. Seminar in Restoration Drama.—*Twice a week; second semester. One unit.*
Professor HILLEBRAND

Courses for Graduates and Advanced Undergraduates

A. ENGLISH LANGUAGE AND LITERATURE

3. The Poetry of Milton.—*Three times a week; second semester.*
Professor E. C. BALDWIN

4. English Versification.—*Twice a week; first semester.*
Assistant Professor LANDIS

5. Shakespeare.—*Three times a week; second semester.*
Professor T. W. BALDWIN

8. Old English (Anglo-Saxon).—*Three times a week; first semester.*
Professor FLOM

9. Beowulf.—*Three times a week; second semester.*
Professor JONES

17. History of the English Language.—*Three times a week; second semester.*
Professor FLOM

25. Chaucer.—*Three times a week; first semester.*
Professor JONES

26. Spenser.—*Three times a week; second semester.*
Professor JONES

30. Tendencies in American Fiction since 1870.—*Three times a week; first semester.*
Dr. TUPPER

35. The English Drama (Previous to Shakespeare).—*Three times a week; first semester.* Professor HILLEBRAND

36. The English Drama (Exclusive of Shakespeare) from 1600 to 1700.—*Three times a week; second semester.* (Not given 1932-33.) Professor HILLEBRAND

38. The Arthurian Tradition.—*Three times a week; second semester.* Associate Professor PARRY

39. Introduction to Medieval Literature.—*Three times a week; first semester.* Associate Professor PARRY

43. Browning.—*Three times a week; second semester.* Professor GRAHAM

45. The Development of the Modern Drama.—*Three times a week; first semester.* Professor HILLEBRAND

50. Prose of the First Half of the 17th Century.—*Three times a week; second semester.* (Not given 1932-33.) Professor ZEITLIN

52. The Great Novelists of the Nineteenth Century.—*Three times a week; first semester.* Professor BERNBAUM

53. Modern American Criticism.—*Three times a week; second semester.* Professor ZEITLIN

54a-54b. Introduction to Comparative Literature.—*Three times a week; both semesters.*

Professors BERNBAUM, ARON, CARNAHAN, OLDFATHER, VAN HORNE; Associate Professors PARRY, HAMILTON; Assistant Professor LANDIS; Dr. BUSEY.

56. Tennyson.—*Three times a week; first semester.* Professor GRAHAM

57. Great Foreign Novelists in Relation to the English Novel.—Goethe, Hugo, Manzoni, Balzac, Dumas, Flaubert, Zola, Turgenev, Dostoevski, Tolstoi. *Three times a week; first semester.* (Not given 1932-33.) Professor BERNBAUM

B. RHETORIC

17. Advanced Composition.—*Three times a week; second semester.* Dr. TUPPER

C. PUBLIC SPEAKING

4. Advanced Debating.—*Three times a week; both semesters.* Associate Professor SANDFORD

6. Forms of Public Address.—*Three times a week; first semester.* Associate Professor SANDFORD; Mr. WALTZ

7. Masters of Public Address.—*Three times a week; second semester.* Associate Professor SANDFORD

8. Dramatization.—*Three times a week; first semester.* Mr. SWANSON

11. Play Production.—*Three times a week; second semester.* Mr. SWANSON

16. Advanced Study of Acting.—*Twice a week; first semester.* Mr. SWANSON

D. SCANDINAVIAN LANGUAGES

Preparation for major graduate work in the Scandinavian languages or literature must include a good knowledge of one of the Scandinavian languages and systematic work in the undergraduate courses in Scandinavian. Any graduate student in language may, however, be admitted to the purely philological courses.

Courses for Graduates

101. Old Norse.—Introduction to the language; grammar; reading of the Prose Edda in part, and selections from the sagas. *Twice a week; first semester. One unit.* Professor FLOM

102. Old Danish and Interpretation of Oldest Runic Inscriptions.—*Twice a week; second semester. One unit.* (Not given in 1932-33.) Professor FLOM

103. Old Swedish.—*Twice a week; second semester. One unit.* Professor FLOM

110. Advanced Old Norse (Old Norse Poetry).—Critical study of the Poetic Edda. *Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor FLOM

130. The Runic Inscriptions (Introduction to Primitive Germanic).—*Twice a week; second semester. One unit.* (Not given, 1932-33.) Professor FLOM

150. Research.—Special problems in Scandinavian philology or literature. *Once a week. One-half to one unit.* Professor FLOM

ENTOMOLOGY

The prerequisite for graduate work in entomology is two years of undergraduate biology, including zoology and entomology. Entrance on major work in entomology requires at least six hours of entomology. A reading knowledge of French and German is desirable by the beginning of the second year.

Courses for Graduates

102. Research in the Morphology and Embryology of Insects.—*Once or twice a week; both semesters. One-half to two units.* Associate Professor HAYES

107. Insect Anatomy.—Lectures and Laboratory. *Three times a week; both semesters. One-half unit.* (Given in 1932-33 and in alternate years.) Associate Professor HAYES

108. Research in Economic Entomology.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

109. Research in Systematic Entomology.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF, Assistant Professor BALDUF

110. Research in the Biology and Ecology of Insects.—*Once or twice a week; both semesters. One-half to two units.* Professor METCALF

Courses for Graduates and Advanced Undergraduates

6. Special Problems.—*Once or twice a week; both semesters.* Various instructors

10. Morphology and Taxonomy of Immature Insects.—Lectures and laboratory. *Three times a week; both semesters.* (Given in 1933-34 and in alternate years.)
Associate Professor HAYES

20. Insect Control.—Lectures and laboratory. *Three times a week; first semester.*
Professor METCALF

21. Insect Bionomics.—Lectures and readings. *Three times a week; second semester.*
Professor METCALF

FARM ORGANIZATION AND MANAGEMENT

(See Agricultural Economics)

GENETICS

Those desiring a general training in genetics may take a major or minor in botany or zoology. Those desiring to approach agricultural problems through genetics may take a major or minor in agronomy, horticulture, or animal husbandry.

For courses in the subject see departments of Agronomy, Animal Husbandry, Botany, Horticulture, and Zoology.

GEOLOGY

For graduate work in geology the student must have had at least a major in geology and an acceptable field training. Other graduate students with adequate technical preparation may be admitted to certain graduate courses.

For graduate work in geography the student must have had at least the equivalent of a major in geography.

Courses for Graduates

101. Advanced Crystallography.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.)
Professor QUIRKE

102. Igneous Petrography.—Lectures; laboratory. *Twice a week; both semesters. One unit.*
Professor QUIRKE

103. Metamorphic Petrography.—Lectures; laboratory. *Twice a week; first semester. One unit.* (Not given in 1932-33.)
Professor QUIRKE

104. Pre-Cambrian Stratigraphy.—*Twice a week; second semester. One unit.* (Not given in 1932-33.)
Professor QUIRKE

108. Ore Deposition.—Problems in the origin of ore deposits, as illustrated by selected mining districts. *Three times a week; both semesters. One unit.* (Not given in 1932-33.)
Professor QUIRKE

122. Mountain and Continental Structures.— A study of the structure and dynamics of mountain ranges and of other areas having interesting structural problems. *Three times a week; second semester. One unit.*
Assistant Professor SHEPARD

125. Sedimentation.—The interpretation of sedimentary rocks in terms of their origin. *Twice a week; first semester. One unit.*
Assistant Professor WANLESS

135. Research.—*Once a week; both semesters. One-half to four units.*
Professors DEWOLF, SAVAGE, QUIRKE, BLANCHARD; Associate Professor HOWARD; Assistant Professors SUTTON, SHEPARD, WANLESS, CRICKMAY

142. Paleozoic Stratigraphic Paleontology.—The invertebrate index fossils of the successive geologic formations. *Twice a week; both semesters. One unit.*
Professor SAVAGE

143. Post-Paleozoic Stratigraphic Paleontology.—Stratigraphic study of post-Paleozoic formations with a consideration of characteristic fossils. *Twice a week; both semesters. One unit.* Assistant Professor SUTTON

144. Micropaleontology.—Technique, systematic study of the important groups of micro-fossils, practical application to geology. *First semester. One unit.*
Assistant Professor CRICKMAY

151. Advanced Dynamic Geology.—A critical analysis of geologic processes and their results; the materials and structure of the earth; problems of geologic interpretations. *Three times a week; first semester. One unit.* Assistant Professor SHEPARD

152. Advanced Historical Geology.—Cosmogeny; the record of diastrophism; the development of the continents and oceans; the relationship between oceanic fluctuations and organic differentiation and evolution; physiographic, climatic, and organic history. *Three times a week; second semester. One unit.*
Assistant Professor CRICKMAY

160. Petroleum Geology.—*Twice a week; both semesters. One unit.*
Associate Professor HOWARD

161. Applied Petroleum Geology.—*Twice a week; first semester. One unit.* (Not given in 1932-33.) Associate Professor HOWARD

162. The Theory and Application of Geophysical Methods.—*Twice a week; second semester. One unit.* (Not given in 1932-33.) Associate Professor HOWARD

163. Geologic Development of the Continents.—The paleography of continents other than North America, together with an outline of the geology of these continents as described in foreign geological literature. *Three times a week; both semesters. One unit.* Associate Professor HOWARD

Courses for Graduates and Advanced Undergraduates

A. GEOLOGY

9. Invertebrate Paleontology.—*Three times a week; first semester.*
Professor SAVAGE

15. Structural Geology.—Rock deformation and its results. *Three times a week; second semester.* Assistant Professor SHEPARD

16. Stratigraphy.—Fossil faunas, with special reference to Paleozoic invertebrates. *Three times a week; second semester.* Assistant Professor SUTTON

38. Regional Geology of the United States.—The characteristics of individual geologic provinces. Recitations. *Three times a week; first semester.*
Assistant Professor CRICKMAY

47. Systematic Mineralogy.—*Three times a week; first semester.* (Not given in 1932-33.) Professor QUIRKE

48. Silicate Minerals and Rocks.—*Five times a week; second semester.* (Not given in 1932-33.) Professor QUIRKE

49. Microscopic Mineralogy.—*Five times a week; second semester.*
Professor QUIRKE

60a-60b. Introduction to Research.—*Two or four times a week; both semesters.*
Members of the department

95. Economic Geology.—The nature, occurrence, origin, and uses of coal, oil, building stones, and bedded deposits of economic importance. *Three times a week; first semester.* Professor DEWOLF

96. Economic Geology.—The nature, occurrence, and origin of metaliferous deposits. Theories of ore deposition. *Three times a week; second semester.*
Professor QUIRKE

B. GEOGRAPHY

8. Geography of Europe.—*Three times a week; first semester.*
Professor BLANCHARD

10. Geography of Africa.—*Three times a week; first semester.* (Not given in 1932-33.) Assistant Professor PAGE

11. Geography of Asia.—*Three times a week; second semester.* Dr. POGGI

12. Historical Geography of the United States.—*Three times a week; first semester.* (Not given in 1932-33.)

14a. Climate of the Continents.—*Three times a week; second semester.*
Assistant Professor PAGE

53a-53b. Advanced Economic Geography.—*Three times a week; both semesters.*
Professor BLANCHARD

60a-60b. Introduction to Research.—See Geology. Members of the staff

GERMAN

Germanic Languages and Literature

Students desiring to take German as a major are required to have finished successfully a four-year course of undergraduate work in German, or its equivalent. They are also required to be familiar with the principal works of the writers of the classical and modern periods of German literature, to show a general knowledge of the history of German literature, and to be able to follow lectures in the German language.

Of collateral subjects, a reading knowledge of French is important and is required for advanced graduate work. Some acquaintance with Latin and with German history is highly desirable.

Courses for Graduates

101. Seminar in Goethe and Schiller.—*Twice a week; both semesters. One unit.*
Professor ARON

102. Thesis.—*Both semesters. One-half to two units.*
Professors ARON, BROOKS; Associate Professor WILLIAMS

103. Introduction to the Historical Study of the Germanic Languages.—History of German philology; comparative grammar of the old Germanic dialects. *Twice a week; first semester. One unit.* Associate Professor WILLIAMS

105. Old High German.—Grammar and interpretation of the oldest literary documents. *Twice a week; second semester. One unit.* Associate Professor WILLIAMS

110. Early German Drama.—German drama up to the Reformation. *Twice a week; second semester. One unit.* (Not given in 1932-33.) Professor BROOKS

113. German Literature of the Fifteenth and Sixteenth Centuries.—*Twice a week; first semester. One unit.* Professor BROOKS

117. German Literature of the Seventeenth and Eighteenth Centuries.—*Twice a week; both semesters. One unit.* Professor ARON

121a. The Nibelungenlied.—*Twice a week; second semester. One unit.* Associate Professor WILLIAMS

Courses for Graduates and Advanced Undergraduates

19a-19b. Goethe's Faust.—The Faust legend and early Faust books and plays; the genesis of Goethe's *Faust;* reading of both parts. *Twice a week; both semesters.* Professor BROOKS

26a. German Literature up to 1800.—*Three times a week; first semester.* Professor ARON

26b. German Literature since 1800.—*Three times a week; second semester.* Professor ARON

31. Middle High German.—*Twice a week; first semester.* Associate Professor WILLIAMS

32. History of German Civilization.—*Three times a week; second semester.* Professor BROOKS

GREEK

(See Classics)

HISTORY

Graduate work in history requires two years of college work in this subject, or sixteen semester hours, which should ordinarily include introductory courses in European and American history. Linguistic preparation is important, especially in French and German. For medieval history some knowledge of Latin is essential, and Spanish is useful for certain fields of American history.

Advanced courses in history at the University of Illinois are of three kinds: (1) Courses for information and guidance in general reading. (2) Instruction in methodology, historiography, and bibliography. A part of this work (in course 103) is required of all graduate students in history during their first year. (3) Seminary courses for the study of special fields with a view primarily to training in the methods of historical criticism and research.

Illinois Historical Survey.—Students of history have an opportunity to pursue research in western history in connection with the Illinois Historical Survey, which is an organization for the purpose of carrying on systematic studies in the history of Illinois.

Attention is also called to the fact that the University of Illinois has for some time coöperated with the Trustees of the State Historical Library in the gathering and editing of archive material. As a result of this relation instructors and graduate students in the department have contributed from time to time to the publications of the Library and have been given useful training in the study of manuscript as well as of printed material.

Higher Degrees in History.—The following statement regarding the specific requirements for higher degrees in history is subject to the general requirements of the Graduate School.

Master of Arts

In addition to meeting the usual tests in the specific courses taken, each candidate for this degree will ordinarily be required to pass a general written examination early in the year and toward the close of the second semester an examination, also written, in two of the following fields: ancient history; medieval history of continental Europe; modern history of continental Europe; English history; American history; Latin-American history. The candidates are expected to have a general knowledge of historical methods (see course 103). The department further requires a working knowledge of one important foreign language, ordinarily French or German.

Doctor of Philosophy

Major Requirements.—A candidate who selects history as his major subject may offer himself for examination in any four of the fields indicated below, stating also the particular field among these four in which he wishes to specialize and in which his thesis is to be written:

1. Ancient history. 2. Medieval history and institutions of continental Europe, to the close of the thirteenth century. 3. Continental Europe from 1300 to 1648. 4. Continental Europe and its dependencies since 1648 (except as included in 5 and 6). 5. The history of England and its dependencies (not including America before 1783). 6. The history of the United States. 7. The history of Latin America. This enumeration of fields is not to be regarded as excluding the possibility of accepting others as may be determined by the department in individual cases.

Minor Subjects.—A candidate for the doctorate in history may select as his first minor one of the divisions of the field of history listed above which is not offered as a part of his major. He should preferably, however, select his minors from subjects offered by other departments. The following list of suitable minors is intended to be suggestive rather than exhaustive or compulsory.

I. In Political Science.—(Any two acceptable for a first minor; any one, for a second minor.) 1. International law and diplomacy. 2. Modern government. 3. Municipal government. 4. Constitutional and administrative law and jurisprudence. 5. Political theory.

II. In Economics and Sociology.—(Any two acceptable for a first minor; any one, for a second minor.) 1. Economic history. 2. Economic theory. 3. Public and private finance. 4. Social reform. 5. Principles of sociology.

III. In Philosophy and Education.—(Any two acceptable for a first minor; any one, for a second minor.) 1. History of ancient and medieval philosophy. 2. History of modern philosophy. 3. History of education.

IV. In Literature.—Some division of the history of literature which may be either comparative literature of a limited period or the literature of a particular country for a more extended period as may be agreed upon in each case.

Courses for Graduates

101. Seminar in American History.—*Once a week; two hours; both semesters. One unit.*

Semester I: Introduction to research in American History.
Professor ROBERTSON

Semester II: Guidance in the investigation of selected topics. Professor RANDALL

102. Seminar in English History.—A study of selected topics in the early modern period. *Arrange hours; both semesters. One unit.* Professor DIETZ

103. Historiography and Historical Method.—Required of all candidates for an advanced degree in history who do not present evidence of similar training elsewhere. *Twice a week; first semester. One-half unit.* Professor RANDALL

104. Seminar in European History.—*Once a week; two hours; both semesters. One unit.* Professor LYBYER

105. Research in Special Topics.—Guidance in writing theses for advanced degrees. *One to two units.*

Professors LARSON, LYBYER, ROBERTSON, PEASE, JONES, RANDALL, DIETZ, HANSEN; Associate Professors SWAIN, RODKEY; Assistant Professors DUNBAR, WERNER.

106. Seminar in Medieval History.—*Arrange hours; both semesters. One unit.* Professor LARSON

122. History of the West.—An intensive study of the westward movement, 1760-1816. *Twice a week; both semesters. One unit.* Professor PEASE

126. Spain in Europe and America, 1750-1825.—Bibliography, historiography, and topical reports. *Arrange hours; first semester. One unit.* Professor ROBERTSON

127. Spanish-American Relations.—Relations of the Latin-American nations with the United States. The Monroe Doctrine, intervention, etc. *Arrange hours; second semester. One unit.* Professor ROBERTSON

133. History of Europe in the Nineteenth Century.—*Once a week; two hours; both semesters. One unit.* Associate Professor RODKEY

138. History of France in the Seventeenth Century.—*Twice a week; both semesters. One unit.* Professor JONES

150. Seminar in Ancient History.—Problems in the relations of East and West. *Arrange hours; both semesters. One unit.* Associate Professor SWAIN

Courses for Graduates and Advanced Undergraduates

16a-16b. The American Colonies in the Eighteenth Century and the Beginnings of National Life and Organization.—*Three times a week; both semesters.*
Assistant Professor DUNBAR

17a-17b. Social and Economic Forces in the United States in the Nineteenth Century.—*Three times a week; both semesters.* Professor HANSEN

19a-19b. The History of American Immigration.—*Twice a week; both semesters.*
Professor HANSEN

20a-20b. History of the South.—*Twice a week; both semesters.* Professor RANDALL

21. History of the United States since 1877.—*Twice a week; first semester.* Professor ROBERTSON

25. The Civil War and the Reconstruction.—*Three times a week; first semester.* Professor RANDALL

26. History of the Latin-American Colonies.—*Three times a week; first semester.* Professor ROBERTSON

27. History of Latin America from the Wars of Independence to the Present Time.—*Three times a week; second semester.* Professor ROBERTSON

29. America and Europe, 1776-1850.—Foundations of international intercourse, with particular reference to the Latin-American colonies and states. *Three times a week; second semester.* Professor ROBERTSON

30a-30b. History of the Near East in Medieval and Modern Times.—*Three times a week; both semesters.* Professor LYBYER

32a-32b. History of Europe since 1878.—*Three times a week; both semesters.* Professor LYBYER

36a-36b. History of the German People in Medieval and Modern Times.—*Three times a week; both semesters.* Associate Professor RODKEY

37a-37b. History of Eastern and Southern Asia.—*Three times a week; both semesters.* (Not given in 1932-33.) Professor LYBYER

38a-38b. Development of the French Monarchy in Early Modern Times, 1285-1648.—*Three times a week; both semesters.* Professor JONES

39a-39b. The Renaissance and the Reformation.—The transition from medieval to modern ideals. *Three times a week; both semesters.* (Not given in 1932-33.) Professor JONES

44a-44b. Constitutional History of England.—*Three times a week; both semesters.* Professor LARSON

46a-46b. The Industrial Revolution and English Social Politics, 1750-1928.—*Three times a week; both semesters.* Professor DIETZ

47a-47b. History of England in the Early Modern Period, 1399-1603.—*Three times a week; both semesters.* (Not given in 1932-33.) Professor DIETZ

48. Social and Economic History of the Middle Ages.—*Twice a week; second semester.* (Not given in 1932-33.) Professor LARSON

55. History of the Ancient Greek States.—*Three times a week; first semester.* Professor OLDFATHER

56. History of the Roman Republic.—*Three times a week; second semester.* Professor OLDFATHER

57a-57b. Ancient Imperialism, Hellenistic and Roman.—*Three times a week; second semester.* Associate Professor SWAIN

60. The United States in the World War.—*Three times a week; second semester.*
Professor RANDALL

62a-62b. Political and Constitutional History of the United States.—*Three times a week; both semesters.* Professor RANDALL

HOME ECONOMICS

As preparation for graduate work with a major in foods and nutrition the student must have had at least the equivalent of the foods and nutrition required in the undergraduate curriculum for the general major in home economics and, in addition, 3-5 hours in foods, dietetics, and nutrition; also quantitative chemical analysis.

As preparation for graduate work with a major in general home economics a student must have had the equivalent of the undergraduate curriculum for the general major in home economics, including a course in the principles of economics.

In addition to graduate courses in home economics the student will offer, for a major in foods and nutrition, either Chemistry 50a or 40 and 41, and for the general major, further courses in education, economics, or sociology.

Courses for Graduates

101. Home Economics.—*Twice a week; both semesters. One unit.*
Professor WARDALL

102. Research in Nutrition.—*Both semesters. One-half to three units.*
Assistant Professor OUTHOUSE

103. Nutrition Seminar.—*Once a week; both semesters. One-half unit.*
Assistant Professor OUTHOUSE

104. Research in Foods.—*Both semesters. One-half to three units.*
Associate Professor WOODRUFF

105. Foods Seminar.—*Once a week; both semesters. One-half unit.*
Associate Professor WOODRUFF

Courses for Graduates and Advanced Undergraduates

20. Infant Nutrition.—*Twice a week; first semester.*
Assistant Professor OUTHOUSE

28. Organization and Management of the Household.—*Twice a week; first semester.* Assistant Professor NICKELL

31. Clothing.—*Three times a week; second semester.* Miss WHITLOCK

33. Diet in Disease.—*Three times a week; both semesters.*
Assistant Professor BARTO

35. Problems in Foods.—*Three times a week; second semester.*
Associate Professor WOODRUFF

39a-39b. Readings in Food and Nutrition.—*Once a week; both semesters.*
Associate Professor WOODRUFF; Assistant Professors OUTHOUSE, BARTO; Mrs. MEYER

41. Problems in Nutrition.—*Three to five times a week; second semester.*
Assistant Professor OUTHOUSE

43a-43b. Problems in Textiles and Clothing.—*Three times a week; both semesters.*
Assistant Professor JACOBSEN, WEAVER; Misses WHITLOCK, BARNES

45. Nutrition Classes.—*Twice a week; second semester.*
Assistant Professor BARTO

48. Institutional Dietaries and Administration.—*Three times a week; second semester.* Assistant Professor SMITH

50. Costume Design.—*Three times a week; second semester.* Miss BARNES

51. Textiles.—*Twice a week; second semester.* Assistant Professor JACOBSEN

55. Food and Nutrition.—*Five times a week; first semester.*
Assistant Professor OUTHOUSE

56. Child Development.—*Twice a week; second semester.*
Assistant Professor WALLS

57a-57b. Problems in Household Management.—*Three times a week; both semesters.* Assistant Professor NICKELL

HORTICULTURE

Graduate work is offered in the Department of Horticulture leading to the M.S. and Ph.D. degrees. Candidates may specialize for either degree in floriculture, olericulture, or pomology.

Twenty hours of collegiate work in horticulture and allied subjects are required for entrance upon major work, and twelve hours for minor work.

Courses for Graduates

103. Olericulture.—*Both semesters. One to two units.* Professor LLOYD

105. Marketing Fruits and Vegetables.—*Three times a week; first semester. One to two units.* Professor LLOYD

106. Olericulture Seminar.—*Once a week; both semesters. One-fourth unit.*
Professor LLOYD

108. Pomology.—*Both semesters. One to four units.*

(a) **Pomological Problems.** Professor BLAIR

(b) **Pomology and Fruit Breeding.** Professor DORSEY

(c) **Pomological Physiology.** Professor RUTH, Assistant Professor KELLEY

(d) **Small Fruits.** Professor COLBY

(e) **Pomological Pathology.** Professor ANDERSON

115. Floriculture.—*Both semesters. One to two units.*

(a) **Floricultural Problems.** Professor DORNER

(b) **Floricultural Physiology and Pathology.** Associate Professor WEINARD

120. Pomology Seminar.—*Once a week; both semesters. One-fourth unit.*
Professors DORSEY, RUTH, ANDERSON

125. Fruit Development.—*Three times a week; first semester. One unit.*
Professor DORSEY

130. Physiology of Fruit Production.—*Three times a week; first semester. One unit.* Professor RUTH

135. Fruit Disease Research.—*Three times a week; first semester. One unit.*
Professor ANDERSON

140. Advanced Small Fruit Culture.—*Three times a week; second semester. One unit.* Professor COLBY

Courses for Graduates and Advanced Undergraduates

12. Evolution of Horticultural Plants.—*Three times a week; first semester.*
Professor DORSEY

43. Greenhouse Fertilizers.—*Three times a week; first semester.*
Associate Professor WEINARD

44. Current Pomological Literature.—For seniors and graduates specializing in pomology. *Once a week; both semesters.* Professor RUTH

45. Plant Nutrition.—*Three times a week; second semester.*
Associate Professor WEINARD

47. Fruit Storage.—The effects of environment upon fruits. The storage of fruits. *Three times a week; first semester.* Professor RUTH

51. Fruit Diseases.—*Three times a week; second semester.* Professor ANDERSON

LIBRARY SCIENCE

Candidates for the master's degree in library science must have completed at least thirty semester hours' work in library science in this institution or in an approved institution.

Students desiring to prepare for work in special types of libraries will be expected to include at least one unit of advanced courses in appropriate subjects other than library science. All such changes in the program of the student must be approved by the Director of the Library School.

Courses for Graduates

101. Thesis.—*One to two units.* Professor WINDSOR and others

102. Seminar.—Special topics in library administration and history, and in bibliography. *Once a week; both semesters. One unit.*
Professor WINDSOR; Assistant Professor BOYD and others

103. Advanced Reference Problems.—*Twice a week; first semester. One-half unit.*
Miss PHELPS

104. Advanced Cataloging and Classification.—*Twice a week; second semester. One-half unit.* Assistant Professor BOND

Courses for Graduates and Advanced Undergraduates

7. History of Libraries.—*Twice a week; second semester.*

9. History of Books and Printing.—History of the early forms of books; the invention and spread of printing; the book trade; book-binding. *Twice a week; second semester.* (Not given in 1932-33.) Professor WINDSOR

13a. Government Publications.—*Twice a week; first semester.*
Assistant Professor BOYD

24a-24b. Selection of Books.—*Twice a week; both semesters.* Miss HOSTETTER

26b. Library Administration.—*Three times a week; second semester.*
Miss GRAMESLY and others

42. Government Publications.—*Three times a week; second semester.*
Miss PHELPS

44. Bookbuying for the Large Library.—*Twice a week; first semester.* (Given in 1933-34 and in alternate years.) Miss GARVER

45. Library Buildings.—*Twice a week; first semester.*
Professor WINDSOR, Miss GRAMESLY

46. High-School Library Administration.—*Three times a week; second semester.*
Miss HOSTETTER

47. Subject Bibliography.—*Twice a week; second semester.* Miss PHELPS

MATHEMATICS

Students entering on graduate study with a major in mathematics must have had twenty-five hours of undergraduate work in mathematics, including a one-year course in calculus and one advanced course such as a course in theory of equations, or in differential equations. They should be able to read German and French.

Candidates for a doctor's degree taking a first minor in mathematics are expected to have completed a course in calculus and are required to take two one-year courses beyond the calculus; candidates for a doctor's degree taking a second minor are required to complete at least one course throughout a year beyond the calculus.

The courses offered by the department are arranged in cycles of two or of three years, so that a student will have opportunity to take any particular course offered by the department, for which he is qualified, in three years of residence required for the doctor's degree.

Courses for Graduates

100. Seminar.—For thesis work, or for special reading with the consent of the instructor. *Three times a week; both semesters. One to two units.*

Professors CARMICHAEL, SHAW, EMCH, COBLE; Associate Professors CRATHORNE, HAZLETT, LYTLE; Assistant Professors LEVY, BRAHANA. For the master's degree: Assistant Professor BAILEY; Dr. STEIMLEY, Dr. KETCHUM, Dr. BOURGIN, Dr. PEPPER, Dr. HOPKINS

101. Functions of Real Variables.—*Three times a week; both semesters. One unit.*
Professor CARMICHAEL

110. Elliptic Functions.—*Three times a week; both semesters. One unit.* (Not given in 1932-33.) Professor CARMICHAEL

112. Linear Difference Equations.—*Three times a week; both semesters. One unit.* (Not given in 1932-33.) Professor CARMICHAEL

113. Linear Differential Equations.—*Three times a week; both semesters. One unit.* (To be given in 1933-34.) Professor CARMICHAEL

124. The Theory of Numbers.—First semester: Theory of congruences and residues. Second semester: Theory of algebraic numbers. *Three times a week; both semesters. One unit.* (Not given in 1932-33.) Associate Professor HAZLETT

126. Theory of Groups.—Introductory course. *Three times a week; second semester. One unit.* (Not given in 1932-33.) Dr. HOPKINS

129. Theory of Statistics.—The mathematical theory underlying statistics with applications to problems in economics, biology, and sociology. *Three times a week; both semesters. One unit.* Associate Professor CRATHORNE

130. Selected Topics in Higher Algebraic Geometry.—*Three times a week; both semesters. One unit.* Professor EMCH

131. Algebraic Geometry.—*Three times a week; both semesters. One unit.* Professor COBLE

135. Differential Geometry.—*Three times a week; both semesters. One unit.* (Not given in 1932-33.) Assistant Professor LEVY

139. Analysis Situs.—*Three times a week; both semesters. One unit.* (Not given in 1932-33.) Assistant Professor BRAHANA

141. Vector Methods.—*Three times a week; both semesters. One unit.* (Not given in 1932-33.) Professor SHAW

143. Linear Algebras.—*Three times a week; both semesters. One unit.* (Not given in 1932-33.) Professor SHAW

145. Linear Operators.—*Three times a week; both semesters. One unit.* (Not given in 1932-33.) Professor SHAW

170. Algebra.—*Three times a week; both semesters. One unit.* Professor SHAW

171. Analysis.—*Three times a week; both semesters. One unit.* Assistant Professor BRAHANA

172. Geometry.—*Three times a week; both semesters. One unit.* Assistant Professor LEVY

Courses for Graduates and Advanced Undergraduates

16-17. Differential Equations and Advanced Calculus.—*Three times a week; both semesters.* Assistant Professor BAILEY, Dr. STEIMLEY

21. Theory of Probability.—*Three times a week; second semester.* Associate Professor CRATHORNE

22. Statistics.—May be counted only toward a minor in mathematics. *Three times a week; first semester.* Associate Professor CRATHORNE

30-31. Actuarial Theory.—*Three times a week; both semesters.* (To be given in 1933-34.) Associate Professor CRATHORNE

32. History of Mathematics.—*Three times a week; second semester.* Associate Professor LYTLE

35. Teachers' Course.—May be counted only toward a minor in mathematics. *Three times a week; both semesters.* Associate Professor LYTLE

36. Advanced Aspects of Euclidean Geometry.—*Three times a week; first semester.* Associate Professor LYTLE

40. Fundamental Concepts of Mathematics.—*Three times a week; second semester.* (To be given in 1933-34.) Associate Professor LYTLE

52. Differential Equations of Mathematical Physics.—*Three times a week; both semesters.* (To be given in 1933-34.) Dr. BOURGIN

53. Integral and Operational Equations in Mathematical Physics.—*Three times a week; both semesters.* Dr. BOURGIN

60. Introduction to the Theory of Numbers.—*Three times a week; second semester.* (Not given in 1932-33.) Dr. PEPPER

70. Introduction to Higher Algebra.—*Three times a week; both semesters.* Associate Professor HAZLETT

71. Introduction to Higher Analysis.—*Three times a week; both semesters.* Dr. KETCHUM

72. Introduction to Higher Geometry.—*Three times a week; both semesters.* Professor COBLE

MECHANICAL ENGINEERING

The prerequisite for graduate work in mechanical engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in mechanical engineering in the branches of the subject in which registration is desired.

Courses for Graduates[1]

107. Thermodynamics and Heat Motors.—*Twice a week; both semesters. One unit.* Associate Professor GOFF

108. The Flow of Fluids and Heat Transfer.—*Twice a week; either semester. One unit.* Professor MACINTIRE

109. Machine Design.—*Twice a week; either semester. One unit.* Professor LEUTWILER

112. Laboratory Investigations.—*Three times a week; both semesters. One and one-half units.* Professors WILLARD, KRATZ, POLSON, HAM, MACINTIRE

[1]Courses offered to junior and senior students are open for minor credit to students majoring in other departments.

MECHANICS, THEORETICAL AND APPLIED

The prerequisite for the courses for graduates in theoretical and applied mechanics is the equivalent of the undergraduate courses in theoretical and applied mechanics required for the degree of Bachelor of Science in engineering.

Courses for Graduates

101. The Development of Basic Ideas in Mechanics.—*Twice a week; first semester. One unit.* Professor MOORE

103. Hydraulics.—*Twice a week; first semester. One unit.* Professor ENGER

107. Laboratory Investigations in Strength of Materials.—*Twice a week; both semesters. One to two units.* Professor MOORE

108. Laboratory Investigations in Hydraulics.—*Twice a week; both semesters. One to two units.* Professor ENGER

109. Laboratory Investigations in Plain and Reinforced Concrete.—*Twice a week; both semesters. One to two units.* Professor RICHART

110. Analytical Study of Experimental Work on Reinforced Concrete.—Beams, frames, and footings. *Twice a week; first semester. One unit.* Professor RICHART

111. Analytical Study of Experimental Work on Reinforced Concrete.—Columns and slabs. *Twice a week; second semester. One unit.* Professor RICHART

112. Structural Mechanics.—*Three times a week; first semester. One unit.* Professor WESTERGAARD

113. Graphical and Approximate Methods of Structural Analysis.—*Twice a week; second semester. One-half unit.* Professor WESTERGAARD

114. Theory of Elasticity with Applications to Engineering Problems.—*Three times a week; first semester. One unit.* Professor WESTERGAARD

115. Theory of Elasticity with Applications to Engineering Problems (Continuation of 114).—*Twice a week; second semester. One unit.* Professor WESTERGAARD

116. Resistance of Materials.—*Twice a week; first semester. One unit.* Professor SEELY

117. The Properties of Engineering Materials.—*Twice a week; second semester. One unit.* Professor SEELY

Courses for Graduates and Advanced Undergraduates[1]

41. Advanced Mechanics of Materials.—*Three times a week; first semester.* Professor SEELY

42. Engineering Materials.—*Three times a week; second semester.* Professor SEELY

43. Laboratory Work in Hydraulics.—*Twice a week; second semester.* Professor ENGER

[1]Other courses offered senior students are open for minor credit to students majoring in other departments.

44. Laboratory Work in Testing Materials.—*Three times a week; second semester.* Professor MOORE, Associate Professor PUTNAM

METEOROLOGY

(See Geology)

MINERALOGY

(See Geology)

MINING ENGINEERING

The prerequisite for graduate work in mining engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in mining in the branches of the subject in which registration is desired.

In addition to the regular university laboratories, the laboratory connected with the investigation of mining conditions in Illinois now being carried on jointly by the Engineering Experiment Station through the Department of Mining Engineering and the State Geological Survey is available for graduate instruction.

Courses for Graduates

101. Advanced Mining Practice.—*Twice a week; either semester. One unit.* Professor CALLEN

102. Advanced Preparation of Coal and Ores.—*Twice a week; either semester. One unit.* Assistant Professor MITCHELL

104.[1] **Mining Reports.**—*Twice a week; either semester. One unit.* Professor CALLEN

105.[1] **Welfare Work and Education among Mine Employees.**—*Twice a week; either semester. One unit.* Professor CALLEN

106.[1] **Advanced Coal, Ore, and Metallurgical Plant Design.**—*Twice a week; second semester. One unit.* Assistant Professor MITCHELL

107.[1] **Advanced Non-Ferrous Metallurgical Projects.**—*Twice a week; either semester. One unit.* Assistant Professor MITCHELL

Courses for Graduates and Advanced Undergraduates

6. Mechanical Engineering of Mines.—*Three times a week; first semester.* Professor CALLEN

8. Mine Administration.—*Three times a week; first semester.* Mr. NICHOLSON

9. Preparation of Coal and Ores.—*Three times a week; first semester.* Assistant Professor MITCHELL

16. Non-Ferrous Ore Treatment.—The reduction of gold, silver, copper, lead and zinc ores. *Five times a week; second semester.* Assistant Professor MITCHELL

15. Mine Ventilation.—*Twice a week; second semester.* Professor CALLEN

[1]Of courses 104 and 105 only one will be given either semester, according to election of students; the same applies to courses 106 and 107.

20. Mine Ventilation Laboratory.—*Twice a week; second semester.*
Professor CALLEN

21. Mine Examination and Valuation.—*Three times a week; second semester.*
Mr. NICHOLSON

41. Principles of Mining and Metallurgical Design.—*Three times a week; first semester.* Assistant Professor MITCHELL

42. Mining and Metallurgical Design.—*Twice a week; second semester.*
Assistant Professor MITCHELL

64. Mining Laboratory.—*Twice a week; second semester.*
Assistant Professor MITCHELL

PHILOSOPHY

Students who enter on graduate work with philosophy as their major subject must have had a general course in the history of philosophy, a course in logic, and a general course in psychology.

Courses for Graduates

103. Ethics.—*Twice a week; first semester. One unit.* Professor MORROW

105. Seventeenth Century Continental Thought.—*Twice a week; first semester. One unit.* Professor TAWNEY

106. English and American Idealism.—*Twice a week; second semester. One unit.*
Professor MORROW

110. Locke, Berkeley, Hume.—*Twice a week; first semester. One unit.* (Not given in 1932-33.) Professor MORROW

112. German Idealism.—*Twice a week; second semester. One unit.*
Professor TAWNEY

119. Seminar in Ancient and Medieval Philosophy.—*Twice a week; first semester. One unit.* Professor MCCLURE

120. Seminar in Modern Philosophy.—*Twice a week; second semester. One unit.*
Professor MCCLURE

Courses for Advanced Undergraduates and Graduates

3. History of Ancient and Medieval Philosophy.—*Three times a week; first semester.* Professor MCCLURE

4. History of Modern Philosophy.—*Three times a week; second semester.*
Professor MCCLURE

7. Ethics.—*Three times a week; first semester.* Professor MORROW

8. Philosophy of the Recent Past.—*Three times a week; first semester.*
Assistant Professor NICHOLSON

9. Political and Social Ethics.—*Three times a week; second semester.*
Professor MORROW

10. Philosophy of Science.—*Three times a week; first semester.*
Assistant Professor GOTSHALK

11a. Philosophy of Religion (systematic).—*Three times a week; first semester.*
Professor TAWNEY

12. Philosophy of Art.—*Three times a week; first semester.*
Assistant Professor GOTSHALK

16. Metaphysics.—*Three times a week; second semester.*
Assistant Professor GOTSHALK

PHYSICS

A year of calculus and a year of general physics, with laboratory, are prerequisite for all major and minor graduate work in physics. In addition, graduate students majoring in physics must have had one more advanced course in either physics or mathematics and should be able to use references in German.

Courses for Graduates

104a-b. Electrical and Magnetic Measurements.—Credit will not be allowed for more than one of courses 15, 44a, and 104a. *Two times a week of three hours each; both semesters. One unit.* Professor KNIPP; Associate Professor WILLIAMS

122. Dynamics.—*Four times a week; both semesters. One unit.* Professor KUNZ

123. Dynamical Theory of Sound.—*Three times a week; second semester. One unit.* Professor WATSON

124. Conduction of Electricity through Gases.—*Three times a week; second semester. One unit.* Professor KNIPP

125. Hydrodynamics.—Especially modern problems in flow and turbulence. *Twice a week; both semesters. One-half unit.* Professor KUNZ

126. Theory of Elasticity.—*Three times a week; second semester. One unit.* (Not given in 1932-33.) Professor KUNZ

127. Recent Problems in Physics.—In 1932-33 this course will deal chiefly with special and general relativity. *Three times a week; both semesters. One unit.*
Mr. MOTT-SMITH

128. Problems and Methods in Theoretical Physics.—*Three times a week; both semesters. One unit.* Assistant Professor BARTLETT

129. Mechanical Vibrations.—The general theory, with applications to plates, rotating shafts, gyroscopes, structures, etc. *Twice a week; both semesters. One-half unit.* (Not given in 1932-33.) Professor KUNZ

131a. Investigation of Special Problems.—Emphasis on the technique of glass-blowing and on discharges in gases. *First semester. One-half or one unit.*
Professor KNIPP

131b. Investigation of Special Problems.—Emphasis on electronic and spectroscopic phenomena. *Second semester. One-half or one unit.*
Assistant Professor KRUGER

146. Electrodynamics.—*Four times a week; both semesters. One unit.* (Not given in 1932-33.) Professor KUNZ

147. Electric Oscillations.—*Twice a week; both semesters. One-half unit.* (Not given in 1932-33.) Professor KUNZ

170. Light.—Largely physical optics and spectroscopy. Lectures, assigned readings and recitations, with laboratory experiments. *Both semesters. One to two units.* Dr. ALMY

184. Line Spectra and Atomic Structure.—*Three times a week; first semester. One unit.* Professor LOOMIS

185. Band Spectra and Molecular Structure.—*Three times a week; second semester. One unit.* Professor LOOMIS

186a-b. Quantum Mechanics.—*Three times a week; both semesters. One unit.* (Not given in 1932-33.) Assistant Professor BARTLETT

190. Research.—*Both semesters One to three units.* Professors in the department

198. Seminar.—*Both semesters. One to two units.* Professors in the department

199. Physics Colloquium.—Attendance is expected of all graduate students. *Once a week; both semesters. No credit.* Professor LOOMIS

Courses for Graduates and Advanced Undergraduates

14a-b. Theoretical Mechanics.—*Three times a week; both semesters.* Mr. MOTT-SMITH

15. Electricity and Magnetism.[1]—Recommended to students in non-technical courses who wish a knowledge of electricity and magnetism beyond the course in general physics. Credit will not be allowed for more than one of courses Physics 15, 44a, and 104a. *Two recitations or lectures and one three-hour laboratory exercise weekly; second semester.* Associate Professor WILLIAMS

16. Heat.—*Three times a week; first semester.* Associate Professor PATON

17. Light.[1]—Recommended to students in non-technical courses. *Two lectures and a three-hour laboratory period weekly; first semester.* Assistant Professor KRUGER

23. Sound.—*Three times a week; first semester.* Professor WATSON

25. Architectural Acoustics.—*Twice a week; second semester.* Professor WATSON

30. Introduction to Theoretical Electricity.—For advanced students in physics, chemistry, mathematics, and engineering. *Three times a week; first semester.* Associate Professor WILLIAMS

36. Heat Laboratory.—To accompany Physics 16. *One three-hour period a week; first semester.* Associate Professor PATON

44a-b. Electrical and Magnetic Measurements.—Credit will not be allowed for more than one of courses Physics 15, 44a and 104a. *Two three-hour periods a week; both semesters.* Professor KNIPP; Associate Professor WILLIAMS

[1] This course may not be taken for major credit.

45. Kinetic Theory of Heat and Radiation.—*Three times a week; second semester.* Associate Professor PATON

46. Advanced Electrical Measurements.—*Two times a week of three hours each; second semester.* Associate Professor WILLIAMS

50. Theory and Use of Optometric and Other Optical Instruments.—*Four times a week; first semester.* (Not given in 1932-33.) Associate Professor SCHULZ

71a-b. Light.—For advanced students in physics, chemistry, mathematics or engineering. *Twice a week; both semesters.* Dr. ALMY

72a-b. Light Laboratory.—To accompany Physics 71a-b. *Twice a week; both semesters.* Dr. ALMY

78. X-rays.—*Three times a week; second semester.* Dr. SANDERS

PHYSIOLOGY

The prerequisites for graduate work in physiology are Physiology 1 or 4, 2 and 6 or equivalent.

Courses for Graduates

101. Journal Club.—Review of literature. *Both semesters. One-fourth unit.* Associate Professor BURGE

102. Research.—*Both semesters. One to two units.* Associate Professor BURGE

103. Special Phases of the Physiology of Respiration, Circulation, Digestion, Metabolism, Excretion, Secretion, Glands of Internal Secretion, Nervous System.—*Both semesters. One-half to one unit.* Associate Professor BURGE

Course for Graduates and Advanced Undergraduates

9. Advanced Mammalian Physiology.—*Three times a week; first semester.* Associate Professor BURGE

POLITICAL SCIENCE

Graduate work in political science is conducted in the following special fields: (1) political theory; (2) international law and diplomacy; (3) modern government; (4) constitutional law, administrative law, and jurisprudence; (5) municipal administration.

To be admitted to take political science as a major subject, the student must have done at least 18 hours of undergraduate work in political science, economics, and history, not less than nine hours of which have been in political science. To take political science as a minor he must have had at least nine hours' work in these fields, including six hours in political science.

If a student making political science his major is taking both of his minors in other departments, one of them must be in history, economics, or sociology.

Several courses given in other departments are so closely related to those in political science that graduate students whose major is political science may be permitted on petition to take such courses as part of their major work. Attention is called to the courses in public law in the College of Law, the courses in city planning given by the College of Fine and Applied Arts, and the technical courses in municipal and sanitary engineering in the College of Engineering.

Courses for Graduates

101. History of Political Theories.—*Three times a week; first semester. One unit.* Professor GARNER

102. The Nature of the State.—*Twice a week; second semester. One unit.* Professor FAIRLIE

103. Seminar in Political Science and Public Law.—*Once a week; both semesters.* Members of the department

104. Municipal Administration.—*Twice a week; first semester. One unit.* Professor FAIRLIE

105. The American Constitutional System.—*Twice a week; first semester. One unit.* Professor MATHEWS

106a. Special Topics in International Law.—Research course. *Twice a week; first semester. One unit.* Professor GARNER

106b. Special Topics in International Law.—Research course. *Twice a week; second semester. One unit.* Professor GARNER

107. Foreign Relations of the United States.—*Twice a week; first semester. One unit.* (Not given in 1932-33.) Professor MATHEWS

108. Problems of International Organization.—Special problems in the field of international organization, with special attention to the League of Nations. *Twice a week; first semester. One unit.* Professor BERDAHL

112. Public Administration.—Studies in national, state, or local administration in the United States. *Twice a week; second semester. One unit.* Professor FAIRLIE

114. Studies in Political Parties.—*Twice a week; second semester. One unit.* Professor BERDAHL

Courses for Graduates and Advanced Undergraduates

4. Municipal Government.—*Three times a week; first semester.* Assistant Professor KNEIER

5. Constitutional Law of the United States.—*Three times a week; first semester.* Professor MATHEWS

6a. International Law.—*Three times a week; first semester.* Professor GARNER

6b. International Law (Continuation of 6a).—*Three times a week; second semester.* Professor GARNER

7. American Diplomacy.—*Three times a week; second semester.* Professor MATHEWS

8. International Organization.—*Twice a week; second semester.* Professor BERDAHL

9. Principles of Jurisprudence.—*Three times a week; first semester.* Professor FAIRLIE

11. Constitutional Aspects of Social and Industrial Problems.—*Three times a week; second semester.* Assistant Professor HYNEMAN

12. National Administration in the United States.—*Three times a week; second semester.* Professor FAIRLIE

13. State Administration in the United States.—*Three times a week; first semester.* Assistant Professor HYNEMAN

14a. Political Parties: Party History and Issues.—*Three times a week; first semester.* (Not given in 1932-33, alternates with Political Science 14b.) Professor BERDAHL

14b. Political Parties: Party Organization and Methods.—*Three times a week; first semester.* (Alternates with Political Science 14a.) Professor BERDAHL

18. Legislation in the United States.—*Three times a week; second semester.* (Not given in 1932-33.)

21. British Government.—*Twice a week; first semester.* Professor FAIRLIE

21a. Problems in British Government.—*Once a week; first semester.* Professor FAIRLIE

22. Continental European Governments.—The constitutions and political systems of the principal countries of continental Europe. *Three times a week; second semester.* Professor GARNER

28. Problems of Contemporary Politics.—A survey of factors of major importance in domestic and foreign politics. *Three times a week; second semester.* (Not given in 1932-33.)

32. Principles of Political Science.—*Twice a week; second semester.* Professor FAIRLIE

34. Municipal Problems.—Municipal administration in the United States and Europe. *Three times a week; second semester.* Assistant Professor KNEIER

PSYCHOLOGY

Graduate students who elect psychology as their major subject must have had standard courses, of university grade, both in general psychology and in the psychological laboratory. One general university course is the minimal requirement for graduate students who apply to the department for a minor subject.

102. Translation of Psychological Treatises.—Critical reading of French and German books and articles. *Both semesters. One-half unit.* Professor WOODROW

103. Research.—Experimental investigations. *Both semesters. One-half to two units.*

Professor WOODROW; Associate Professors CULLER, YOUNG; Assistant Professor HIGGINSON

105. Seminar.—Discussion of current topics in their historical setting, with especial emphasis upon research problems. *Both semesters. One unit.* Professor WOODROW

106. Neural Theory of the Psychological Functions.—*Second semester. One unit.* Associate Professor CULLER

108. Quantitative Methods.—The logic of research methods in psychology. *First semester. One unit.* Associate Professor CULLER

Courses for Graduates and Advanced Undergraduates

5. Comparative Psychology.—A systematic survey of animal behavior with particular reference to the behavior of the vertebrates. Laboratory and discussion. *Three times a week; second semester.* Dr. MCALLISTER

7. Imagination and Thought.—Recent experimental literature of memory, imagination, and thought. *Twice a week; second semester.* Dr. SULLIVAN

8. Feeling and Emotion.—A critical analysis of the facts, problems, and methods of affective psychology, with special reference to recent physiological studies. *Twice a week; second semester.* (Not given in 1932-33.) Associate Professor YOUNG

9. Physiological Psychology.—The physiological basis of conscious experience. *Twice a week; second semester.* (Not given in 1932-33.) Associate Professor YOUNG

10. Mental and Physical Work.—The psychology of work and the factors affecting it, with special reference to work in industry. *Twice a week; second semester.* Dr. RUCH

11. Learning and Comprehension.—Processes and functions in acquiring knowledge and skill. *Twice a week; second semester.* Associate Professor CULLER

12-13. Minor Problems (Advanced Laboratory).—Application of methods suitable to new problems in general and comparative psychology. *Three times a week; both semesters.*

Professor WOODROW; Assistant Professor HIGGINSON; Dr. MCALLISTER

14. Social Psychology.—Socialization viewed from the standpoint of the group and of the individual member. Socialization of psychological functions. Conflict and adjustment. *Three times a week; second semester.* Dr. SULLIVAN

16. Genetic Psychology.—*Twice a week; first semester.* Dr. SULLIVAN

17. The History of Psychology.—*Three times a week; second semester.* (Not given in 1932-33.)

18. Perception.—Perceptual experience; recent revisions of perceptual theory including the doctrine of the *Gestalt.* Lectures and discussions. *Twice a week; first semester.* Associate Professor CULLER

20. Systematic Psychology.—A critical study of contemporary systems: behaviorism, *Gestalt psychologie*, structural, functional and dynamic psychology. For seniors and graduates. *Twice a week; second semester.* Professor WOODROW

21. Character and Personality.—An analysis of the non-intellectual aspects and determinants of mentality and conduct, with special applications to behavior problems and personnel psychology. *Three times a week; second semester.* Dr. HERRINGTON

23. Abnormal Psychology.—Analytical consideration of types of behavior deviating from the normal. *Three times a week; second semester.* Dr. HERRINGTON

26. Recent Experimental Problems (Sensation).—Recent experimental methods and results. *Twice a week; first semester.* Dr. MÖLLER

28. The Psychology of Motivation.—Instinct, drive, desire, habit, and attitude as determinants of behavior; mental conflicts and types of adjustment. *Twice a week; first semester.* Associate Professor YOUNG

30. Attention.—Lectures and discussions. *Twice a week; second semester.* Dr. MÖLLER

34. Individual Differences.—A study of the variation in the mental characteristics of individuals and of groups. *Three times a week; first semester.* Professor WOODROW

RAILWAY ENGINEERING

The prerequisite for graduate work in railway engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in railway engineering in the branch of the subject in which registration is desired.

Courses for Graduates

102. Locomotive Design.—*Twice a week; both semesters. Two units.* Professor YOUNG

106. Locomotive Operation.—*Once a week; either semester. One unit.* Professor SCHMIDT

110. Railway Location.—*Twice a week; either semester. One unit.* Professor KING

Courses for Graduates and Advanced Undergraduates

3. Locomotives.—*Twice a week; first semester.* Mr. SCHRADER

4. Locomotives.—*Three times a week; second semester.* Mr. SCHRADER

31. Railway Yards and Terminals.—*Three times a week; first semester.* Professor KING

33. Economic Theory of Railway Location.—*Four times a week; second semester.* Professor KING

35. Railway Signaling.—*Twice a week; first semester.* Professor KING

62-64. Electric Railway Laboratory and Practice.—*Five times a week; first semester.* Associate Professor TUTHILL

70-74. Electric Railway Design and Economics.—*Five times a week; second semester.* Associate Professor TUTHILL

ROMANCE LANGUAGES AND LITERATURE

Before entering on the study of Romance languages as a major for the degree of A.M., the candidate must have had at least three years of college work in one Romance language, together with a satisfactory reading knowledge of another. A reading knowledge of German is also highly desirable. Before being accepted as a recognized

candidate for the degree of Ph.D., he must have had, in addition, satisfactory training in Latin, and must be able to read ordinary German prose. Before entering on the study of Romance languages as a first or second minor, the candidate must have had two years of college work in the language desired.

FRENCH

Courses for Graduates

101. Old French Literature.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor OLIVER

102. Villon, Rabelais, Montaigne, La Pléiade.—*Twice a week; both semesters. One unit.* Assistant Professor WILL

103. Seventeenth Century Prose Writers.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor OLIVER

104. Eighteenth Century Prose Writers.—*Twice a week; both semesters. One unit.* Professor OLIVER

127. French Romanticism.—*Twice a week; both semesters. One unit.* Professor CARNAHAN

128. Origin and Development of the Novel in France.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor CARNAHAN

129. Special Problems in French Romanticism.—*Once a week; both semesters. One-half to one unit.* Professor CARNAHAN

132. French Lyric Poetry.—*Twice a week; both semesters. One unit.* Professor MICHAUD

133. La Poésie de Victor Hugo.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor MICHAUD

144. Le Réalisme et le Naturalisme Français.—(In French.) *Twice a week; both semesters. One unit.* Professor MICHAUD

145. Doctrines Littéraires et Courants d'Idées Contemporains.—(In French.) *Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor MICHAUD

175. Old French Phonology and Morphology.—*Twice a week; both semesters. One unit.* Professor OLIVER

195. Seminar.—Research work in preparation for theses in French. *Both semesters. One to two units.* Members of the department

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of French Literature.—*Three times a week; both semesters.* Professor CARNAHAN, Assistant Professor WILL

17a-17b. French Drama of the Nineteenth Century.—*Twice a week; both semesters.* Associate Professor HAMILTON

24a-24b. French Drama of the Seventeenth and Eighteenth Centuries.—*Three times a week; both semesters.* Professor OLIVER

32a-32b. The French Novel in the Nineteenth Century.—*Three times a week; both semesters.* Assistant Professor JACOB

33a-33b. La Littérature Contemporaine.—(In French.) *Twice a week; both semesters.* Professor MICHAUD

34a-34b. La Comédie Humaine de Balzac.—(In French.) *Twice a week; both semesters.* (Not given in 1932-33.) Professor MICHAUD

ITALIAN

Courses for Graduates

140. Italian Literature in the Middle Ages. Petrarch, Boccaccio.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor VAN HORNE

143. Italian Literature in the Renaissance.—*Twice a week; both semesters. One unit.* Professor VAN HORNE

146. Modern Italian Literature.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor VAN HORNE

195. Seminar.—Research work in preparation for theses in Italian. *Both semesters. One to two units.* Professor VAN HORNE

Course for Graduates and Advanced Undergraduates

3a-3b. Dante: The Divine Comedy.—*Twice a week; both semesters.* Professor VAN HORNE

SPANISH

Courses for Graduates

130. Spanish Literature in the Sixteenth Century.—*Twice a week; both semesters. One unit.* Associate Professor HAMILTON

131. Spanish Literature in the Seventeenth Century.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor VAN HORNE

134. Spanish Literature in the Eighteenth Century.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Associate Professor HAMILTON

135. La Novela Española Moderna.—(In Spanish.) *Twice a week; both semesters. One unit.* Associate Professor BALSEIRO

137. La Crítica Literaria en España.—(In Spanish.) *Twice a week; both semesters. One unit.* (Not given in 1932-33.) Associate Professor BALSEIRO

138. Spanish-American Literature.—*Twice a week; both semesters. One unit.* (Not given in 1932-33.) Professor VAN HORNE

185. Old Spanish Readings.—*Twice a week; both semesters. One unit.* Associate Professor HAMILTON

195. Seminar.—Research work in preparation for theses in Spanish. *Both semesters. One to two units.* Members of the department

Courses for Graduates and Advanced Undergraduates

10a-10b. General Survey of Spanish Literature.—*Three times a week; both semesters.* Associate Professor HAMILTON

11a-11b. Cervantes: Don Quixote.—*Twice a week; both semesters.* Professor VAN HORNE

17a-17b. El Teatro Español Moderno.—(In Spanish.) *Twice a week; both semesters.* Associate Professor BALSEIRO

SOCIOLOGY

Preparation for major work in sociology must include at least the equivalent of twenty-three semester hours in the social and biological sciences, of which at least eight must be in sociology. The remaining fifteen hours may be distributed among economics, philosophy, history, psychology, political science and biology (heredity). A thesis is required of all candidates for the master's and the doctor's degrees. Preparation for graduate work in sociology as a minor requires at least six hours of credit in sociology.

Theses subjects may be chosen from any one of the following divisions of the sociological field: General and historical sociology; personality studies; culture theory and culture change; population studies; community studies; social pathology and social adjustment.

Courses for Graduates

100. Sociological Theory.—*Twice a week; first semester. One-half to one unit.* (Not given in 1932-33.) Associate Professor HILLER

102a. Earlier Developments in Sociology.—*Twice a week; first semester. One unit.* Assistant Professor ALBIG

102b. More Recent Developments in Sociology.—*Twice a week; second semester. One unit.* (Not given in 1932-33.) Associate Professor HILLER

103. Development of Culture.—*Twice a week; first semester. One unit.* Assistant Professor ALBIG

106. Urban Communities and Urbanization.—*Twice a week; first semester. One unit.* Assistant Professor TYLOR

107. Rural Communities.—*Twice a week; second semester. One unit.* Assistant Professor TYLOR

108. Research in the Social Effects of Poverty, and Their Prevention and Treatment.—*Twice a week; first semester. One unit.*

109. Research in Criminology.—*Twice a week; second semester. One unit.* Professor TAFT

110. Population.—*Twice a week; first semester. One unit.* Professor TAFT

112. The Sociology of Conflict.—*Twice a week; second semester. One unit.* Professor TAFT

126. Educational Sociology.—*Twice a week; second semester. One unit.*

128. Fusion of Culture Resulting from Immigration.—*Twice a week; second semester. One unit.* Associate Professor HILLER

150. Seminar.—Preparation of theses. *One-half to two units.*
Members of the department

Courses for Graduates and Advanced Undergraduates

I. General Courses

3. Social Evolution.—*Three times a week; first or second semester.* Mr. AHRENS

4. Social Control.—*Twice a week; first or second semester.*
Assistant Professor ALBIG

6. Urban Sociology.—*Three times a week; first semester.*
Assistant Professor TYLOR

7. Rural Sociology.—*Three times a week; second semester.*
Assistant Professor TYLOR

II. Specialized Courses

8. Charities.—*Three times a week; first or second semester.*
Assistant Professor TIMMONS

9. Criminology.—*Three times a week; first or second semester.* Professor TAFT

10. Problems of Population.—*Three times a week; second semester.*
Associate Professor HILLER

14. Group Opinion.—*Three times a week; first semester.* Assistant Professor ALBIG

17. Methods of Sociological Research.—*Three times a week; first semester.*
Associate Professor HILLER

24. Penology.—*Three times a week; second semester.* Professor TAFT

27. Community Organization.—*Three times a week; second semester.*
Assistant Professor TIMMONS

28. Immigration and Assimilation.—*Three times a week; first semester.*
Associate Professor HILLER

29. Human Migrations.—*Three times a week; first semester.* Professor TAFT

30. Races of Mankind.—*Three times a week; first semester.*
Assistant Professor KELLY

40. Ethnology of the American Indians.—*Three times a week; second semester.*
Assistant Professor KELLY

42. Early Civilizations.—*Three times a week; second semester.*
Assistant Professor KELLY

44. Negro Origins.—*Three times a week; second semester.*
Assistant Professor KELLY

45. Prehistoric Archeology.—*Three times a week; first semester.*
Assistant Professor KELLY

TRANSPORTATION

Transportation may be taken as a major or minor for the master's degree and as a minor for the doctorate. No student will be admitted to graduate work in transportation unless he has a satisfactory acquaintance with the principles of economics and in addition such knowledge of the general problems of transportation as is represented by the content of the undergraduate course on the transportation system of the United States.

Course for Graduates

100. Economics of Transportation.—*Once a week; both semesters. One unit.*
Assistant Professor LOCKLIN

Courses for Graduates and Advanced Undergraduates

3. Industrial Traffic Management.—*Three times a week; second semester.*
Assistant Professor LOCKLIN

7. Railroad Finance.—*Three times a week; second semester.*
Assistant Professor LOCKLIN

8. Railroad Organization.—*Twice a week; first semester.*

10. Railroad Rates.—*Three times a week; first semester.*
Assistant Professor LOCKLIN

16. Railroad Operation.—*Three times a week; second semester.*

22. Ocean Shipping.—*Three times a week; first semester.* Professor LITMAN

26. Railroad Problems.—*Three times a week; second semester.*
Assistant Professor LOCKLIN

ZOOLOGY

At least sixteen semester hours of college work in zoology are required for entering on major graduate study in this subject. Under special circumstances advanced work in closely allied subjects may be accepted in lieu of the fourth semester's work in zoology. When zoology is chosen for a minor the courses listed for graduates and undergraduates must be preceded by at least one full year's undergraduate work in zoology.

For the prosecution of graduate study in zoology a reading knowledge of German and French is indispensable and familiarity with Latin and Greek is of great advantage.

Graduate students specializing in zoology are strongly advised to spend at least one summer in study at the seashore. Every candidate for the doctor's degree will be required to furnish evidence of having completed satisfactorily at least one eight-week period in such work at an approved location. To facilitate this plan an investigator's room has been provided at the Woods Hole Marine Biological Laboratory, where members of the department are offered research facilities without cost to themselves. Application for the use of this room should be made to the head of the department early in the year. Similar facilities are sometimes afforded at other marine laboratories.

Students interested in the field of genetics are referred especially to courses 115 and 124.

Courses for Graduates

102. Evolution of the Vertebrates.—*Twice a week; first semester. One-half unit.*
(Given in 1933-34 and in alternate years.) Assistant Professor ADAMS

106. Topics in Embryology.—*Twice a week; both semesters. One unit.*
Professor SHUMWAY

107. Parasitology.—*Once or twice a week; both semesters. One unit.* (Given in 1932-33 and in alternate years.) Professor WARD

109. Physiological Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1932-33 and in alternate years.) Professor SHELFORD

110. Economic Ecology.—*Twice a week; second semester. One-half to one unit.* (Given in 1933-34 and in alternate years.) Professor SHELFORD

111. Experimental and Field Ecology.—*Both semesters. One-half to two units.*
Professor SHELFORD

115. Factors of Individual and Racial Development.—*Twice a week; both semesters. One unit.* Professor ZELENY

117. Faunistic Zoology.—Taxonomy and distribution, with especial reference to the local fauna. *Twice a week; first semester. One unit. Second semester. One-half to one unit.* Professor VAN CLEAVE

127. Theories of Animal Phylogeny.—Relations of various groups of animals; signification of so-called intermediate forms; invertebrate larval forms and theories of descent based on them. *Once or twice a week; both semesters. One unit.* (Given in 1933-34 and in alternate years.) Professor WARD

Individual Research Courses

121. Invertebrate Morphology and Parasitology.—*One to two units.*
Professor WARD

122. Vertebrate Morphology.—*One to two units.* Assistant Professor ADAMS

123. Faunistic and Systematic Zoology.—*One to two units.*
Professor VANCLEAVE

124. Experimental Zoology and Genetics.—*One to two units.* Professor ZELENY

125. Animal Ecology and Behavior.—*One to two units.* Professor SHELFORD

126. Vertebrate Embryology.—*One to two units.* Professor SHUMWAY

Courses for Graduates and Advanced Undergraduates

11. Experimental Ecology and Geography.—*Three or four times a week; first semester.* Professor SHELFORD

17. Field Zoology.—*Twice a week; first semester.* Professor VAN CLEAVE

19. Advanced Ornithology.—*Twice a week; first or second semester.*
Assistant Professor CAHN

20a-20b. Current Investigations.—Must be taken by all graduate students majoring in zoology. *Once a week; both semesters.* Members of the department

21a-21b. Introduction to Zoological Research.—*Two to five times a week; both semesters.* Professor WARD

22-23. Morphology of Vertebrates.—*Two to four times a week; both semesters.*
Assistant Professor ADAMS

31. Introduction to Parasitology.—*Twice a week; first semester.*
Assistant Professor THOMAS

63. Comparative Vertebrate Embryology.—*Two to five times a week; first semester.*
Professor SHUMWAY

66. Ontogeny of Vertebrates.—*Two to five times a week; second semester.*
Professor SHUMWAY

INDEX

Accountancy, 21
Admission, 9, 20
Agriculture, admission, 20
  (For special regulations, see name of department, as Agricultural Economics, Animal Husbandry, etc.)
Agronomy, 24
Animal Husbandry, 25
Architecture, 28
Astronomy, 28

Bacteriology, 28
Botany, 29
Business Law, 31
Business Organization and Operation, 31

Calendar, 5, 6
Ceramic Engineering, 32
Changes in study-lists, 10
Character of graduate work, 9
Chemistry, 33
Civil Engineering, 38
Classics, 40
Courses open to graduate students, 10, 21
Credit, graduate courses, 12
  undergraduate courses, 10

Dairy Husbandry, 41
Degrees, application for, 13
  Doctor's, 15
  Masters', 11
  Professional, in Engineering, 14
Deposit, for laboratory material, 20
  for printing thesis, 17
Diploma fee, 20
Doctor's degree, 15
  examinations, 16
  in engineering, 17
  language requirements, 16
  period of study, 15
  preliminary examinations, 16
  residence, 15
  thesis, 16
  work in other universities, 15
  (For special regulations, see name of department, as Classics, History, etc.)

Economics, 42
Education, 46
Electrical Engineering, 48
Engineering, doctor's degree in, 17
  Master's degree in, 14
  Professional degree in, 14
    Architectural, 14, 28
    Ceramic, 14, 32
    Civil, 14, 38
    Electrical, 14, 48
    Mechanical, 14, 65
    Mining, 14, 67
    Physics, 14, 69
    Railway, 14, 75
English Language and Literature, 48
Entomology, 52
Examinations for doctor's degree, 16
Executive Faculty, 7
Expenses, 20

Faculty, Executive, 7
Failures, 11, 14
Farm Organization and Management, see Agricultural Economics.
Fees, 20
Fellowships, 18
Final examination for doctor's degree, 16
Foreign language requirements, 12, 16
French, 76

Genetics, 53
Geography, 55
Geology, 53
German, 55
Grades, 13

Graduate Club, 20
Greek, 40

History, 56
Home Economics, 60
Horticulture, 61

Incidental fee, 20
Italian, 77

Laboratory fees, 20
Language and Literature, English, 48
  Germanic, 55
  Romance, 75
  Scandanavian, 52
Language requirement, Doctor's degree, 16
  Master's degree, 12
Latin, 40
Libraries, 18
Library Science, 62
Listeners' courses, 10

Majors, 12, 15, 16, 17
Marine biological laboratories, 12
Master of Arts, degree of, 11
  (See also special requirements of various departments, as Economics, Chemistry, etc.)
Master of Science, degree of, 12
Master's degree in Engineering, 14
Mathematics, 63
Matriculation fee, 20
Mechanical Engineering, 65
Mechanics, Theoretical and Applied, 66
Medical Science, summer work in, 11
Meterology, see Geology
Mineralogy, see Geology
Mining Engineering, 67
Minors, 12, 15, 16, 17
Miscellaneous courses, 10

Organization of Graduate School, 9

Philosophy, 68
Physics, 69
Physiology, 71
Political Science, 71
Preliminary examinations for doctor's degree, 16
Professional degrees in Engineering, 14
Psychology, 73
Public Speaking, 51

Railway Engineering, 75
Registration, 9
Residence study, 11, 15
Rhetoric, 51
Romance Languages and Literature, 75

Scandanavian Languages, 52
Scholarships, 18
Seniors and graduate study, 10
Sociology, 78
Spanish, 77
Staff, students on, 11
Study-lists, changes in, 10
  fee for late changes, 20
Summer study, 11

Theoretical and Applied Mechanics, 66
Thesis, Doctor's, 16
  Master's, 13
Transfer of graduate credit, 12
Transportation, 80
Trustees, Board of, 2
Tuition, 20
Visitors, 10

Withdrawal, 11

Zoology, 80

University of Illinois

The Graduate School

Announcement for 1933-1934

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THE UNIVERSITY OF ILLINOIS
URBANA

CONTENTS

	PAGE
Board of Trustees	5
Graduate School Calendar	6
Executive Faculty	8
History and Organization	9
Admission	9
Character of Graduate Work	9
Registration and Program of Study	9
Masters' Degrees	11
Second Degrees in Engineering	14
The Degree of Doctor of Philosophy	15
Agricultural and Engineering Experiment Stations	18
Scholarships and Fellowships	19
Libraries	20
Fees and Expenses	21
Graduate Club	22

Departments of Instruction

Accountancy	23
Agricultural Economics	24
Agronomy	26
Animal Husbandry	27
Architecture and Architectural Engineering	29
Astronomy	29
Bacteriology	30
Botany	30
Business Organization and Operation	32
Business Law	33
Ceramic Engineering	33
Chemistry	34
Civil Engineering	39
Classics	40
Greek	40
Latin	40
Dairy Husbandry	41
Economics	42
Education	45
Electrical Engineering	46
English Language and Literature	46
Speech	49
Scandinavian Languages	49
Entomology	50
Genetics	50
Geology (including Geography)	50
German	52
History	53
Home Economics	56
Horticulture	58

PAGE
Library Science 59
Mathematics 59
Mechanical Engineering 61
Mining Engineering 62
Philosophy 62
Physics 63
Physiology 65
Political Science 65
Psychology 67
Railway Engineering 69
Romance Languages and Literatures 69
French 69
Italian 70
Spanish 71
Sociology 71
Theoretical and Applied Mechanics 73
Transportation 74
Zoology 74

Index 77

UNIVERSITY OF ILLINOIS
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GRADUATE SCHOOL CALENDAR

Summer Session

1933

June 19, Monday.....Registration day

June 20, Tuesday.....Instruction begun

July 4, Tuesday.....Legal holiday

Aug. 5, Saturday, 12 m.....Last day for candidates for degrees in August to deposit theses

Aug. 11, 12, Friday, Saturday.....Summer session examinations

First Semester

1933

Sept. 15, 16, Friday, Saturday.....Registration days

Sept. 18, Monday.....Last day for candidates for masters' degrees in October to file applications for degrees and to deposit theses

Sept. 20, Wednesday, 8 a.m.....Instruction begun

Sept. 22, Friday.....Preliminary examination in French

Sept. 29, Friday.....Preliminary examination in German

Nov. 6, Monday.....Last Day for candidates for professional engineering degrees to file statements of professional study and experience

Nov. 29, Wednesday, 12 m.....Thanksgiving recess begun

Dec. 4, Monday, 1 p.m.....Instruction resumed

Dec. 22, Friday, 11 a.m.....Holiday recess begun

Dec. 30, Saturday, 12 m.....Last day for candidates for professional engineering degrees to submit outlines of theses

1934

Jan. 3, Wednesday, 1 p.m.....Instruction resumed

Jan. 15, Monday.....Last day for filing applications for masters' degrees to be conferred in February, and last day for candidates for the degrees of A.M., M.S., and Ph.D. in February to deposit theses

Jan. 20, Saturday.....Preliminary examination in French

Jan. 23, Tuesday.....Semester examinations begun

Jan. 31, Wednesday.....Semester examinations ended

Feb. 3, Saturday.....Preliminary examination in German

Second Semester

1934

Feb. 2, 3, Friday, Saturday..... Registration days

Feb. 7, Wednesday, 8 a.m..... Instruction begun

Mar. 1, Thursday..... Last day for applications for scholarships and fellowships for 1934-35

Mar. 29, Thursday, 12 m..... Easter recess begun

Apr. 3, Tuesday, 1 p.m..... Instruction resumed

Apr. 27, Friday..... Preliminary examination in French

May 1, Tuesday..... Last day for candidates for professional engineering degrees to deposit completed theses, and last day for filing applications for masters' degrees to be conferred in June

May 4, Friday..... Preliminary examination in German

May 14, Monday..... Last day for candidates for the degree of Ph.D. in June to deposit theses

May 15, Tuesday..... Last day for filing applications for masters' degrees to be conferred in August

May 25, Friday..... Semester examinations begun

May 28, Monday..... Last day for candidates for masters' degrees in June to deposit theses

June 4, Monday..... Semester examinations ended

June 11, Monday..... Sixty-third Annual Commencement

THE GRADUATE SCHOOL
EXECUTIVE FACULTY

ARTHUR HILL DANIELS, PH.D., *Acting President of the University*

ROBERT DANIEL CARMICHAEL, PH.D., *Professor of Mathematics and Acting Dean of the Graduate School*

ROGER ADAMS, PH.D., *Professor of Organic Chemistry*

CLARENCE ARTHUR BERDAHL, PH.D., *Professor of Political Science*

ERNEST BERNBAUM, PH.D., *Professor of English*

EDWARD HERBERT CAMERON, PH.D., *Professor of Educational Psychology*

ARTHUR BYRON COBLE, PH.D., *Professor of Mathematics*

DAVID JOHN DAVIS, M.D., PH.D., *Professor of Pathology and Dean of the College of Medicine*

HERBERT FISHER MOORE, M.E., M.M.E., D.Sc., *Research Professor of Engineering Materials*

REXFORD NEWCOMB, A.M., M.ARCH., A.I.A., *Professor of the History of Architecture and Dean of the College of Fine and Applied Arts*

HENRY PERLY RUSK, M.S., *Professor of Cattle Husbandry*

RAYMOND STRATTON SMITH, PH.D., *Professor of Soil Physics*

NATHAN AUSTIN WESTON, PH.D., *Professor of Economics*

ARTHUR CUTTS WILLARD, B.S., *Professor of Heating and Ventilation and Acting Dean of the College of Engineering*

CHARLES ZELENY, PH.D., *Professor of Zoology*

THE GRADUATE SCHOOL

History and Organization

The University of Illinois offered facilities for advanced study and research in various lines as early as 1872. Organized graduate instruction, however, under the name of the Graduate School, was first undertaken in 1892. In 1894 the administration of the school was vested in the Council of Administration, and the Vice-President of the University became Dean of the School. In 1906 the Graduate School was organized as a separate faculty.

By action of the Trustees the teaching faculty of the Gradaute School includes all members of the University Faculty who give instruction in approved graduate courses. The affairs of the School, however, are in charge of the Executive Faculty.

Admission

Admission to the Graduate School may be granted to graduates of institutions whose requirements for the bachelor's degree are substantially equivalent to those of the University of Illinois and to applicants from other institutions approved by the Executive Faculty, as hereinafter provided. *Admission to the Graduate School does not, however, imply admission to candidacy for an advanced degree, and gives no right or claim to be so admitted. Such candidacy is determined by the faculty after the student has demonstrated by his work here, for from two to five months, that he has the ability to do major work of graduat character. A mere accumulation of "credits" or "grades" is not sufficient.*

Admission to graduate courses may be granted only to those who have had the requisite undergraduate work in those courses or departments. But a student of mature age who satisfies the Dean and the department concerned of his ability to pursue graduate work in a given line may be enrolled in particular graduate courses, without reference to a degree, and permitted to carry on such study or investigation under the direction of a department of the University as the department shall recommend and the Dean approve.

Application blanks for admission may be secured from the Registrar of the University. Every applicant must submit with his application for admission an official transcript of his college record.

Character of Graduate Work

The principal aim of graduate study is the development of the power of independent work and the promotion of the spirit of research. Each candidate for a degree is expected to have a wide knowledge of his subject and of related fields of work; for the graduate student is not expected to get from lecture and laboratory courses all the knowledge and training necessary to meet the requirements for his degree.

Registration and Program of Study

The following regulations concerning registration and program of studies are laid out primarily for first-year students. Second-year and third-year gradu-

ate students fill out their programs irrespective of the unit value of courses, according to their needs, under the advice of their instructors.

Registration.—Each graduate student must register at the beginning of each semester. The registration of a new student may be accepted at any time provided the student is prepared to take up courses actually under way. Credit towards the fulfillment of the residence requirement dates, however, from the time of registration and not from the beginning of the semester or year in which the student enters. Registration will not be permitted later in the year than April 1, except in the case of students who expect to continue through the summer session, or are returning to complete a year's work which has been interrupted by unavoidable circumstances. *No student is permitted to attend any university course in which he is not registered.*

A new student must fill out in duplicate an application for admission and submit it to the Registrar, from whom, after the approval of his application, he will receive a card of admission and a study-list which will give details of procedure in registering. He should fill out the study-list after consultation with his adviser, or the person in charge of his major work, and also with the instructors whose courses he wishes to elect. *Registration, including the payment of fees, must be completed by the close of the registration days of the Graduate School. Otherwise a fee of $5.00 for late registration will be charged all former students.*

Changes in Study-lists.—A graduate student is expected to plan his work so carefully that changes in his study-list during the semester will not be necessary. When a change seems advisable, however, it may be permitted without fee if made within three weeks of the date of registration. After that date a fee of one dollar is charged for each change, except that the total charge for rearrangement authorized on any one change slip shall not exceed two dollars.

Advanced Undergraduate Courses Open to Graduate Students.—

1. *Courses not open to students below senior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as unit courses for graduate credit, or as half-unit courses when listed for less than four hours of undergraduate credit.

2. *Courses open to students of junior standing.* Unless otherwise specified on the student's program by the department concerned, such courses listed for four or five hours of undergraduate credit are treated as half-unit courses for graduate credit, or as quarter-unit courses when listed for two to three hours undergraduate credit. Courses to which sophomores are regularly admitted may not be taken for graduate credit, either major or minor.

Seniors and Graduate Study.—If at the beginning of the second semester of his senior year a student who has been in residence at least one year is within five hours of a bachelor's degree, he may be permitted to register for courses which may count for residence for a master's degree, provided his program does not require more than twelve formal class, lecture, or laboratory exercises a week, and is approved by the Dean at the time of registration. Only students of excellent record will be allowed this privilege.

Miscellaneous and Listeners' Courses.—Graduate students are permitted under proper circumstances to attend classes as listeners, and to elect miscellaneous subjects, that is, courses which do not count toward an advanced degree. Listeners' cards may be obtained at the Dean's office. A graduate student in full standing and carrying a minimum program, may be permitted, under proper circumstances, to attend one class as a listener, or to elect one miscellaneous subject (that is, a course which does not count towards an advanced degree). No subject is open as a listener's or miscellaneous course unless it has a specific educational bearing on the student's major or minor subjects of study.

A student who elects a miscellaneous course is required to register in it, do the work, and pass the semester examinations, unless he is permitted to withdraw under the rules. A student who has a listener's card is not permitted to participate in the class work or the examination.

No student may register for a full minimum program of work for graduate credit if it is necessary for him to carry at the same time more than one miscellaneous subject and to visit one course.

Students on the Staff.—Assistants and others on the university staff who undertake to do graduate work are permitted to take an amount of work determined by the terms of their employment. Such a student, if required by his engagements to teach more than five classes a week or to have laboratory work or supervision exceeding ten hours a week, may not receive his master's degree at the end of one year, nor his doctor's degree at the end of three.

Residence and Work Done Elsewhere.—Continuous residence and study are required of all members of the Graduate School, unless they are granted leave of absence by the Dean, upon recommendation of the professor in charge of their work, for the purpose of carrying on elsewhere studies or investigation in the line of work for their degrees.

Graduate Study in the Summer.—Graduate students in the summer session are subject to the same scholastic requirements as those in the regular university year. Their study-lists must be approved by the Dean of the Graduate School, or his representative. Attendance during four out of six consecutive summer sessions, or one semester and two summer sessions, is considered the equivalent of one year in residence. The faculty is unwilling to accept summer-session work beyond the master's degree towards the doctor's degree, except in the case of a student who works in a summer session preceding or following a regular year's attendance at the University. In no case may the last year's work for the doctorate be done in disconnected summer sessions.

No course offered in the summer session may be taken for credit towards a higher degree unless it is described in the summer-session circular as accepted for that purpose.

Summer Work in Medical Sciences.—Graduate courses in medical sciences are offered in the summer quarter between June and September at the College of Medicine of the University of Illinois in Chicago. Circulars describing the courses offered and conditions of admission and work may be obtained from the Secretary of the College of Medicine, 1853 W. Polk Street, Chicago.

Failures.—A graduate student who fails in any course in his major subject cannot secure his degree in the same year in which the failure occurred. No condition examinations are given graduate students.

Withdrawal.—If after registration a graduate student wishes to withdraw from any course or to add other work, he must first secure the necessary papers from the Dean's office. See the regulations concerning changes in study-lists, page 10. If he wishes to withdraw from the University he must get clearance papers at the Dean's office.

MASTERS' DEGREES

Character of Masters' Degrees.—The master's degree conferred depends upon the character of the bachelor's degree. The usual practice is that A.M. shall follow A.B., and that M.S. shall follow B.S. However, this practice may be departed from in cases where the undergraduate course of study of the candidate was of a kind for which some reputable institutions in this country give A.B., while others give B.S.

Amount of Work Required.—Candidates for the degree of Master of Arts or Master of Science are required to do at least one full year's work in residence, including a thesis. By this is meant from four to five unit courses each semester or their equivalent. A unit course is one which requires ten hours of time a week through one semester, or a minimum of 180 hours, irrespective of the mode of distribution of that time in class work, laboratory work, and private study. Four such courses or their equivalent constitute a full *minimum* program for one semester, and eight such courses, or their equivalent, constitute the *minimum formal* year's work accepted for a master's degree. Only first-rate students are permitted to secure a degree with this minimum program.

Unless otherwise permitted, every student must take each semester at least one course open to graduate students only (courses numbered 100 and upwards).

In the first year of his graduate study each student is required to attend a minimum of four formal class, lecture, or laboratory exercises a week. In no case is he permitted during his course to attend more than twelve a week, without permission.

Work Done Elsewhere.—Members of the staff and high school teachers residing and employed in Urbana or Champaign who have done graduate work in approved institutions elsewhere may secure credit not to exceed four units towards the master's degree by passing examinations in that work. They may complete the work for the degree by securing at least four units more while registered in the Graduate School for not less than one academic year.

Students in zoology who take work in a marine or fresh-water biological laboratory or station are permitted to offer not less than six weeks nor more than nine weeks of such work in partial fulfillment of the requirement for the master's degree.[1] This privilege is granted only when the work is done with the permission of the faculty (secured in advance), in an approved laboratory, and under instructors accepted by the faculty. Credit for such work may be secured by examination after the student has submitted an official certificate of attendance at the laboratory or station, together with a full written report of the work done there. No candidate for the master's degree may avail himself of this pro-

[1]The experience at a marine laboratory which, as indicated above, is optional with the candidate for the master's degree, is required of all candidates for the doctorate in zoology.

vision who is not registered in the Graduate School for one full academic year, during which he shall do the rest of the work necessary for his degree.

Similar arrangements are made, under similar conditions, for students of geology in connection with Geological Surveys.

Majors and Minors.—A candidate for a master's degree may do all his work in one subject, or he may select a major and one minor, or a major and two minors. A major or minor denotes the field of knowledge of a department, or such part thereof as constitutes a separate and independent division of that field. For a master's degree a major is at least half the work, or a minimum of four units, for one year. Less than one unit may not be counted as satisfying the requirements of a minor without the approval of the department concerned.

Foreign Language.—The ability to use one or more of the modern languages ordinarily studied in the undergraduate curriculum is expected of all candidates for the master's degree, and in some lines of study is required. No student wlil be permitted to acquire residence toward the second year for the doctorate until he has passed the preliminary examination in at least one of these languages.

Masters' Theses.—Each candidate for a master's degree is required to present two copies of a thesis on some subject approved by the professor in charge of his major work. Such approval, except in case of students working for masters' degrees in summer sessions only, must be secured and the subject of the thesis filed at the office of the Graduate School not later than the beginning of the second half year of residence.

Students working for masters' degrees exclusively in summer sessions must announce their thesis subjects not later than the beginning of their third session in residence. The requirement of a thesis may be waived, however, on the recommendation of the professor in charge of his major work and the approval of the Dean, *provided application to waive the thesis is made at the time for announcing thesis subjects.* A student excused from writing a thesis must replace it with courses of instruction.

No one will be excused from writing a thesis unless one-half of his program of studies consists of courses numbered 100 and upwards.

The thesis required from a candidate for a master's degree ordinarily will demand one-fourth of the student's time and may not exceed one-third of it. The thesis must be typewritten, on "thesis paper,"[1] and the title page must be printed. The carbon copy may be on plain paper of approximately the same weight as the thesis paper. Both copies of the thesis in its final form, together with a certificate of approval by the proper officer, must be left by the professor in charge at the Dean's office at least two weeks before the date on which the degree is to be conferred. No article prepared for another use, or previously published, will be accepted as a thesis.

Applications for Degrees.—Each candidate for the degree of Master of Arts or Master of Science shall file an application for the degree on a blank provided for the purpose, to be had at the Dean's office. For the dates of applications and of deposition of theses, consult the calendar at the beginning of the bulletin.

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[1]No other will be accepted by the Dean. "Instructions for the Preparation of Theses" may be obtained at the Dean's office.

Degrees in August.—Students who expect to become candidates for the master's degree in August may be recommended at the June meeting of the Senate subject to the successful completion of the work for which they are to register in the summer session. However, in order to avail themselves of this privilege, students must file with the Dean before the June meeting of the Senate an exact statement of the work necessary to complete the requirements for the degree. Blanks for this purpose may be secured at the Dean's office.

Thesis Work on Leave of Absence.—Under proper conditions a student may be permitted to complete the last fourth of his work, if devoted to his thesis, under leave of absence for a period not to exceed the equivalent of two semesters. To get such permission the student must have secured credit for at least six units; must petition for the privilege; must submit to the Dean an outline of the proposed investigation, approved by the professor in charge of his major work, and must submit satisfactory evidence that adequate facilities are available to him at the place where he intends to do the proposed work. Approval on all these points must be obtained one collegiate year before the thesis is due. Immediately following approval the student must register and pay an incidental fee of $20.00.

Grades.—Students' work is graded in five classes, A, B, C, D, and E. The last indicates a failure. D indicates unsatisfactory, though passable, work.

A student who receives two units of a grade below B during his first year of graduate work may not complete the first year of residence by carrying the minimum program of eight units for the master's degree. Three units of a grade below B disqualify a student as a candidate for a degree.

A failure or absence from examination in any course or failure in any other examination prescribed by the department of the major may prevent the conferring of the degree; and, as already indicated, failure in any course in the major field precludes the conferring of the degree in the same year.

SECOND DEGREES IN ENGINEERING

Two classes of second degrees are open to graduates of the College of Engineering, namely, academic and professional.

The *academic* second degree in engineering is Master of Science, following Bachelor of Science, in architecture, architectural engineering, civil engineering, electrical engineering, etc. This degree is conferred in accordance with the regulations described above for *academic work in residence only*.

The *professional* second degrees in engineering are as follows:

Master of Architecture, after B.S. in architecture.

Architectural Engineer, after B.S. in architectural engineering.

Ceramic Engineer, after B.S. in ceramic engineering.

Chemical Engineer, after B.S. in Chemical Engineering.

Civil Engineer, after B.S. in civil engineering or in railway civil engineering.

Electrical Engineer, after B.S. in electrical engineering or in railway electrical engineering.

Mechanical Engineer, after B.S. in mechanical engineering or in railway mechanical engineering.

Engineer of Mines, after B.S. in mining engineering.

Engineer-Physicist, after B.S. in engineering physics.

Professional degrees in engineering may be conferred on two classes of candidates: (1) those who have received an academic degree in engineering from the University of Illinois; (2) those who have received an academic degree in engineering[1] from other institutions of equal standing and who have been members of the teaching or research staff of the College of Engineering or Engineering Experiment Station or the Department of Chemistry of the University of Illinois for at least three years prior to the conferring of the professional degree.

A candidate declares his candidacy by filing with the Dean of the College of Engineering, as chairman of the committee in charge, a detailed statement covering his professional engineering experience. This statement must be made upon a standard form supplied by the Dean of the College of Engineering, as chairman of the committee in charge, and must be filed not later than the first Monday in November preceding the commencement at which the candidate expects to receive the degree. No statement of experience will be considered by the committee which does not show that the candidate has had a minimum of four years of acceptable engineering experience after receiving the degree of Bachelor of Science, and that for at least three years he has been in responsible charge of engineering work. Responsible charge in engineering teaching may be considered as responsible charge of work. In determining the acceptability of the engineering experience of the candidate the committee will be guided by the character of his professional work and the degree of responsibility involved, and will take into consideration such evidences of professional ability and growth as may be shown by his investigation of engineering problems, his contributions to technical literature, and his membership and activity in engineering societies.

If the professional experience of the candidate is accepted he must submit for approval, prior to December 31, an outline of his proposed thesis. The completed thesis, in the form prescribed in the "Instructions for the Preparation of Masters' and Doctors' Theses," must be deposited with the Dean of the College of Engineering not later than May 1. The candidate must present himself at commencement in order to receive the degree.

A candidate for a professional engineering degree must pay the incidental fee of seventy dollars on being notified that his professional experience is accepted as qualifying him to enter as a candidate for the degree. No one will be enrolled as a candidate for the degree at the following commencement who does not pay his fee at this time. When a candidate for a professional engineering degree has once been accepted and paid his fee, he is eligible to receive the degree at any time within five years, without additional fee, on completion of the requirements; provided, however, that unless he completes the requirements within two years his name will be dropped from the list of candidates and in order to receive the degree within the five-year period he must register once more.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Major and Minor Subjects.—A member of the Graduate School who desires to become a candidate for the degree of Doctor of Philosophy is required

[1]Including chemical engineering.

to pursue a major subject in the department in which his research lies. He is also required to choose one minor subject, or he may choose two. If one minor only is chosen it must be taken in a department of study other than that of the major, and credit for it may be earned by work representing not less than four units, or one-sixth of the total residence required for the doctorate. If two minors are chosen, one must be a subject closely related to the major. With the approval of the adviser it may be a division of the major field of study. The other minor (not less than two units) must, in that case, be taken in a department of study other than that of the major.

Except by special permission of the Dean the preliminary examination in major and minor subjects may not be taken until the minor work has been done.

Method of Computing Residence.—Credit for a full year of graduate work means that the student has during that time devoted all his working time and energy to study of a graduate grade. After the first year of residence, credit is not recorded in units, and there is no fixed correspondence between credit and courses as in undergraduate work. Thus it is possible for a second-year student to devote all his time to one course and his research; and for a third-year student to devote all his time to his research alone.

Period of Study.—The *minimum* period of study required for securing the degree of Doctor of Philosophy is three years, during which the student is required to devote all his working time to his studies. All three years must be spent in resident graduate study at some accredited educational institution and either the first two or the last one of the three must be spent at the University of Illinois. The degree is conferred, however, not for residence during a certain period, but for scholarly attainments and power of investigation, as proved by a thesis and examinations.

Work Done in Other Universities.—Credit for graduate work done in other universities is not "transferred." However, it may be accepted on examination as equivalent to resident work at the University of Illinois, provided the institution in which it was done is of high standing.

Preliminary Examinations.—

A. In Languages.—The student will be required to demonstrate his ability to read French and German and other languages needed in his work. No student will be permitted to acquire residence towards the second year of graduate study until he has passed the examination in at least one of these languages. Both the examination in French and that in German must be passed before the student is admitted to the preliminary examination in his major and minor subjects. For the dates of these language examinations consult the calendar at the beginning of this bulletin.

Application for admission to these examinations must be made a week, at least, in advance of the date of the examination.

B. In Major and Minors.—Towards the end of his second year of study, or by special permission, at the beginning of this third year (not later than the first Saturday in October), a student who wishes to become a candidate for the degree must submit to a preliminary examination. This examination is intended to test the student's knowledge of the fields of his major and minor subjects of study only. It is partly oral, and may be wholly so.

The student will not be admitted to his preliminary examination until the faculty is satisfied that he has finished substantially the equivalent of two years' graduate work. He must do a full year's graduate work between his preliminary examination and the completion of his work for the doctorate.

Final Examination.—At least two weeks before the time when the degree is conferred, the candidate must submit to a final examination, given by a committee appointed by the Dean. This examination is primarily on the research work of the student, as embodied in his thesis, but it is not confined to that. It extends to the whole field of study of the candidate. It will not be confined to the courses which the candidate has attended in the University of Illinois only, if he has done part of the work elsewhere; nor even to the field covered by the courses specifically taken in this or other universities; but will be so conducted as to determine whether the candidate has a satisfactory grasp of his major subject as a whole, and a general acquaintance with the fields of knowledge represented by his course of study.

The final examination may not be divided. The examination must be taken all at one time even though it requires several sessions.

If after having passed his preliminary examination, he fails in the third year of his study to meet the expectations of the professors in charge of his work, or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

Other Examinations.—Before the candidate is admitted to the final examination and the defense of his thesis, he may be required to take any other examination, oral or written, that is thought proper by the various departments in which he has studied.

The above examinations are in addition to those in the courses for which the student is registered. These must be taken at the time for which they are set in the examination schedule.

Thesis.—The power of independent research must be shown by the production of a thesis on some topic connected with the major subject of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or as many of them as may wish to question him about it, in connection with his final examination.

The subject of the thesis should be chosen not later than the end of the second year of residence and must be submitted for formal approval by the faculty not later than six weeks from the beginning of his third year of residence.

Two typewritten copies of the complete thesis, *the original on thesis paper,*[1] and the first carbon on plain paper of approximately the same weight, and in final form, must be deposited in the office of the Dean for presentation to the examining committee not later than two weeks prior to the final examination and not less than four weeks before the time when the degree is conferred. At the same time, the candidate must deposit with the Dean a manuscript of the essential part, or an abstract, or a digest of his thesis, in condition for publication at a cost not to exceed seventy-five dollars ($75). The manuscript must be sufficient to show the method followed, the evidence used, and the conclusions

[1]No other will be accepted by the Dean.

reached in the investigation, and must bear the approval of the department and the Executive Faculty of the Graduate School.

The candidate must pay to the Comptroller before graduation the sum of seventy-five dollars ($75) out of which the University will print at least one hundred copies of this manuscript for circulation by the University, unless the thesis entire or in abbreviated form is published by the author or is accepted for publication by a standard journal or publisher within a year from the date of graduation. In the latter event, and after one hundred copies have been presented to the University by the writer, the cash deposit shall be returned to him.

The typewritten and printed forms of the thesis must comply with the regulations given in "Instructions for the Preparation of Masters' and Doctors' Theses," copies of which may be obtained at the Dean's office.

Degree of Doctor of Philosophy in Engineering

The degree of Doctor of Philosophy in Engineering is offered in certain lines of academic work of a high scholastic type in engineering science for students who wish to prepare themselves as teachers, investigators, and experts.

The general requirements for this degree, as to preliminary education, linguistic attainments, etc., are the same as in other subjects.

The following lines of engineering science, or others approved by the Graduate School may be elected as majors:

Engineering mechanics
Steam engineering
Hydraulic and sanitary engineering
Electrical engineering
Heating and ventilation engineering
Railway engineering
Masonry construction and structural engineering
Coal-mining engineering
Ceramic engineering

The first minor may be any of the above or one of the following sciences or an authorized combination of two of them:

Theoretical mechanics
Mathematics
Thermodynamics
Bacteriology
Chemistry
Geology
Physics (experimental or mathematical)
Zoology
Botany
Economics

The second minor should be in other than engineering subjects.

AGRICULTURAL AND ENGINEERING EXPERIMENT STATIONS

Attention is called to the unusual opportunities for graduate study in connection with the Agricultural and Engineering Experiment Stations. By undertaking a line of graduate study in close association with some one of the

projects carried on in those Stations, the student will come into contact with aspects of his specialty which he would rarely touch in a purely academic study, and he will thus broaden his outlook. The Experiment Stations make available apparatus, equipment, and the services of mechanicians, which may materially facilitate the carrying on of investigations.

SCHOLARSHIPS AND FELLOWSHIPS

A number of scholarships and fellowships have been established by the Trustees of the University. To first-year graduate students of ability and promise there are open a number of scholarships without stipends but carrying exemption from the payment of tuition, incidental, and laboratory fees. There are two classes of fellowships—University Service Fellowships and Honorary Fellowships. The first are open to second-year and third-year graduate students with stipends of $400 and $500, respectively. They are awarded on the condition that their holders shall be available for teaching, research, and other University services not to exceed one-quarter time in each case. No applicant is eligible for a $400 fellowship who has not passed the preliminary language examination in either French or German before the regular date for filing applications. To be eligible for a $500 fellowship an applicant must have passed both language examinations before the date for filing applications. Honorary Fellowships carry no stipends and no exemption from the payment of fees. Their purpose is to give recognition to superior students who are not in need of financial assistance.

Candidates for these scholarships and fellowships must be graduates of the University of Illinois, or of colleges or universities having equivalent requirements for bachelors' degrees.

Application must be made on blanks to be obtained from the Dean of the Graduate School. These application forms should be sent to the Dean of the Graduate School as early as possible in February of the academic year preceding that for which the fellowship is desired. No application will be considered if received later than March first, until after April fifteenth, the date when appointees from the first list of applications must accept or refuse their appointments.

Persons appointed are notified on April first and must send the Secretary of the Board of Trustees notice of their acceptance or refusal by April fifteenth; and must agree that, if accepted, the appointment will not be resigned to take a similar one in any other institution during the year for which it is awarded.

Nominations to fellowships are made on the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself. Scholarships and fellowships are not given to candidates who are over thirty years of age at the time when the appointment is to be made.

The Carr Fellowship in Chemistry.—The Honorable Robert F. Carr, of the class of 1893, gave in 1919 the sum of ten thousand dollars, the income of which is to be used as the stipendium of a fellowship in chemistry or chemical engineering. The stipend is $750.

LIBRARIES

The general university library, including the departmental libraries and reading rooms listed below, are located at the University in Urbana. The libraries of the College of Pharmacy and the College of Medicine are in Chicago.

These libraries contained on May 1, 1933, about 939,800 volumes, and about 240,800 pamphlets. Of these, 891,473 books and 232,900 pamphlets are in the libraries at Urbana; the rest are in Chicago. The library at Urbana also contains 3,374 maps and 9,090 pieces of sheet music. The departments at Urbana currently receive about 6,000 serials, while the College of Medicine and College of Pharmacy in Chicago receive 250.

The general library of the University is open daily, from 8 a. m. until 10 p. m. and on Sunday from 2:30 p. m. until 5:30 p. m.

A number of departmental and college libraries and reading rooms are maintained in the library and in other buildings on the campus; these libraries do not necessarily contain all the books in the respective subjects. In some instances they are primarily for the use of the graduate students and advanced undergraduate students in the departments using the respective buildings. The principal departmental libraries and reading rooms are the following:

Name of Library	*Location*	*Estimated number of volumes*
Philosophy, Psychology, and Education	Library Building	5,300
Classics	Library Building	15,000
Modern Languages	Library Building	6,600
English	Library Building	6,400
History and Political Science	Library Building	20,100
Economics, Sociology, and Commerce Reading Room	Library Building	3,500
Natural History	Natural History Hall	53,100
Law	Law Building	40,500
Architecture, Ricker Library of	Architecture Building	9,900
Agriculture Reading Room	New Agriculture Building	21,200
Chemistry	Chemistry Building	15,700
Physics	Physics Building	1,600
Mathematics	Mathematics Building	11,300
Engineering	Engineering Hall	29,800

The library includes most of the bibliographical aids published for the book-trade in this and other countries; a Union Card Catalog of books in seven other large American libraries; many printed catalogs of important libraries, e.g., Catalogue of Printed Books in the British Museum, Gesamtkatalog der Preussischen Bibliotheken, and Catalogue Général des livres imprimés de la Bibliothèque Nationale; and many bibliographies of special subjects.

The following brief statements indicate the resources of the library for research in a few subjects selected at random:

Official publications of municipalities number about 32,000 reports, charters and ordinances, issued by over 3,000 American and 300 foreign municipalities, and more or less complete files of about 50 municipal periodicals. Systematic attempts are made to secure current publications, especially of Illinois municipalities.

Mathematics numbers over 11,000 volumes, about 9,500 dissertations and other pamphlets, and includes files of over 300 periodicals and other serials.

Chemistry includes 11,300 volumes of bound periodicals, 4,400 other books, 1,500 pamphlets, 7,200 theses, and receives currently 255 journals, most of which are complete sets.

Italian history includes the Cavagna Library, 40,000 volumes, pamphlets, and maps, and 138 bundles of manuscripts with typed partial index to families and places dealt with; much material of Italian local history, biography, and genealogy.

Classical literature, history, and archaeology embraces approximately 30,000 volumes, including complete sets of about 150 journals and serials; the library of Professor Wilhelm Dittenberger, of Halle, 5,600 items acquired in 1907; the library of Professor Johannes Vahlen, of Berlin, 10,000 items acquired in 1913; and a collection of about 17,000 dissertations, reprints, etc.

The Ricker Library of Architecture numbers 8,800 volumes, 12,000 lantern slides, and 9,000 photographs and drawings. It is not only a good working library for faculty and students in architecture, but contains many of the older and rarer works.

FEES AND EXPENSES

Except as noted below, graduate students pay fees as follows:

Matriculation fee	$10.00
Incidental fee, each semester, for residents of Illinois	35.00
All students, not residents of Illinois, pay each semester an incidental fee of	62.50
Incidental fee for students registered for thesis work towards the master's degree on leave of absence	20.00
Graduation fee	10.00
For late registration	5.00
For change in study-list	1.00

All graduate students who have not matriculated as undergraduates at the University of Illinois pay the matriculation fee on entrance.

All candidates for advanced degrees pay the graduation fee.

Scholars and fellows are exempt from the payment of tuition and incidental fees. They are also exempt from fees charged on their study lists for undergraduate courses if approved by the Head of the Department of their major subject and by the Dean of the Graduate School. Other persons on University appointment at a salary of $1,600 or less are entitled also to these exemptions. Persons on appointment in allied surveys and laboratories in Urbana and the research and educational hospitals in Chicago, superintendents, principals, and teachers employed in the public school systems of Illinois and teachers and members of the staff in colleges and universities of the State who register for graduate work during the period of their employment are permitted the option of paying either the regular incidental fee or $10 a unit in strictly graduate work and $2.50 a credit hour in undergraduate work.

Each student working in the laboratories, or in the drafting or engineering classes, is required to pay a fee of from 50 cents to $15.00 in each course for

chemicals and apparatus used, and for any breakage or damage. But no charges or deposits for laboratory materials are required from scholars, fellows, or members of the corps of instruction or scientific staffs mentioned above, except when breakage or consumption of materials exceeds a certain allowance.

Table board may be obtained at prices ranging from $5 to $7 a week.

Room rent, single room, ranges from $15 to $25 a month; double room, from $10 to $15 a month, each person.

THE GRADUATE CLUB

The Graduate Club is an unofficial organization of the graduate students and faculty. Its purpose is to furnish an opportunity for those working in different departments to become acquainted with one another and thus counteract the tendency toward narrowness which intense specialization may sometimes induce.

DEPARTMENTS OF INSTRUCTION

Courses open to graduate students are of two classes. The first class is wholly of graduate grade, and the courses are numbered 100 upwards. The second class includes the courses classified as for graduates and advanced undergraduates. These carry numbers below 100. The courses numbered 100 and upwards are all accepted for major credit. Those of the other group are in many cases accepted for minor credit only. This is especially true of courses which are open to juniors.

All courses have certain prerequisites for admission. Inasmuch as the prerequisite preparation may be gained at other institutions from courses differing from those offering a similar preparation at the University of Illinois, so that a statement of prerequisites as given here would not be understood elsewhere, their description is omitted altogether. However, a student who wishes to enter a particular course must satisfy the department concerned that he has had in some form the prerequisites for admission to the course.

For the convenience of first-year students the credit value of graduate courses is given in units. These values have no significance for second-year and third-year students.

The credit received for "courses for graduates and advanced undergraduates" is in accordance with the regulations of the Graduate School (see page 10).

Students are admitted to graduate standing in agriculture who have had a thorough training in the sciences underlying agriculture, and who are otherwise eligible to the Graduate School, even though their undergraduate course of study lacked to some extent the amount and kind of technical work in agriculture included in the course of study for the bachelor's degree in agriculture at the University of Illinois.

ACCOUNTANCY

A student may major in accountancy for the master's degree only. The courses may be taken for minor credit by applicants for the master's or doctor's degree in other departments with the approval of the adviser. The courses in accountancy for graduates only may be selected by those who have had approximately 15 university credits in accountancy, including Accountancy 3a or its equivalent. Accountancy 4a is a prerequisite for 104; 3b for 110; 13 for 113; and 20 for 120.

The courses for graduates and advanced undergraduates may be taken by those who have had the equivalent of 12 university credits in accountancy.

Courses for Graduates

103. Advanced Theory and History.—Twice a week; both semesters. *One unit.* Professor Littleton.

104. Accounting Systems.—Twice a week; both semesters. *One unit.* Professor Scovill.

110. Accounting Reports.—Twice a week; second semester. *One unit.* Professor Scovill.

113. Governmental Accounting.—Twice a week; second semester. *One unit.* Professor Morey.

120. Income Tax Development.—Twice a week; first semester. *One unit.* Professor Filbey.

129. Thesis.—Once a week; both semesters. *One unit.* Professor Littleton and members of the staff.

Courses for Graduates and Advanced Undergraduates

3a. Advanced Accounting.—Three times a week; either semester. Professors Filbey, Littleton.

3b. Auditing.—Three times a week; either semester. Professors Filbey, Littleton, Associate Professor Theiss.

4a. Cost Accounting.—Twice a week; either semester. Professor Schlatter.

4b. Accounting Systems.—Twice a week; either semester. Assistant Professor Baily.

5a–5b. C.P.A. Problems.—Three times a week; both semesters. Professor Scovill.

13. Governmental Accounting.—Twice a week; either semester. Dr. Hackett.

20. Income Tax Procedure.—Twice a week; second semester. Professor Filbey.

30. Budgets and Accounting Control.—Three times a week; either semester. Associate Professor Theiss.

AGRICULTURAL ECONOMICS

Graduate students in agricultural economics may do their work in the general field of agricultural economics or specialize in any one of the following: (1) farm organization and management; (2) land economics; (3) agricultural marketing; and (4) agricultural prices and statistics.

Graduate work in agricultural economics as a major subject is open to students under either of two conditions: (1) the student must have done at least 20 hours of undergraduate work in economics, agricultural economics, business organization and operation, accountancy, history, political science, or sociology, of which at least 12 hours must have been in the field of economics and agricultural economics; or (2) the student must have had a thorough training in the principles of agricultural economics consisting of at least 12 hours credit in economics and agricultural economics, either in connection with or in addition to a course of study in agriculture substantially equivalent to that required for the bachelor's degree in agriculture in this University.

To take agricultural economics as a minor, the student must have had at least 20 hours work in agricultural and economic subjects. Two units in agricultural economics will be accepted as satisfying this requirement.

Graduate students who are making agricultural economics their major are required to take at least one course in advanced economic theory. Where such students are taking two minors in other departments, one of them must be in economics, business organization and operation, accountancy, sociology, history, or political science.

Certain courses given in other departments are closely related to those in agricultural economics. A graduate student whose major is in agricultural economics may be permitted, on approval of the departments concerned, to take such courses as part of his major work. Attention is called to graduate courses in economics, transportation, accountancy, business organization and operation, and sociology, as well as those in other departments in the College of Agriculture.

Courses for Graduates

109. Seminar. Thesis Course.—All graduate students majoring in Agricultural Economics must register in Agricultural Economics 109; credit is conditional upon the completion of an acceptable thesis. Once a week; both semesters. *One to two units.* Members of the department.

110. Theory of Agricultural Economics.—Twice a week; both semesters. *One unit.* Associate Professor Stewart.

111. Agricultural Prices and Statistics.—Twice a week; both semesters. *One unit.* Assistant Professor Norton.

112. Agricultural Economics Research.—Credit is conditional upon the completion of an acceptable report of investigation. Once a week; both semesters. *One to two units.* Associate Professor Stewart.

120. Farm Management Principles and Investigational Methods.—Twice a week; both semesters. *One unit.* Professor Case.

135. Marketing Fruits and Vegetables.—Three times a week; first semester. *One to two units.* Professor Lloyd.

Courses for Graduates and Advanced Undergraduates

10. Economic Relationships of Agriculture.—Three times a week; first semester. Assistant Professor Norton.

14. Cooperation in Agriculture.—Twice a week; second semester. Dr. Bartlett.

15. Financing Agriculture.—Three times a week; second semester. Assistant Professor Norton.

17. Economic History of Agriculture.—(Not given in 1933-34.) Twice a week; first semester. Assistant Professor Norton.

18. Land Economics.—Three times a week; second semester. Associate Professor Stewart.

22. Types and Systems of Farming.—Required field trip, expense about $3. Three times a week; first semester. Professor Case, Associate Professor Wilcox.

23. Farm Business Analysis.—Required field trip, expense about $10. Three times a week; second semester. Assistant Professor Johnston.

24. Farm Operation.—Required field trip, expense about $3. Twice a week; first semester. Assistant Professor Johnston.

25. Farm Organization.—Required field trip, expense about $10. Three times a week; second semester. Professor Case.

26. Farm Administration.—Twice a week; first semester. Professor Case.

31. Grain Grading and Marketing.—Required inspection trip, expense about $15. (Not given in 1933-34.) Three times a week; second semester. Associate Professor Pieper.

34. Marketing Dairy Products.—(Not given in 1933-34.) Twice a week; second semester.

36. Marketing Horticultural Products.—For seniors and graduates specializing in horticulture. Three times a week; first semester. Professor Lloyd.

37. Marketing Livestock.—The class will visit a terminal livestock market; estimated cost of the trip, $18. Twice a week; second semester. Associate Professor Ashby.

41. Problems in Agricultural Economics.—Once a week; both semesters.

(a) Agricultural Marketing.—Members of the department.
(b) Agricultural Prices and Statistics.—Assistant Professor Norton.
(c) Farm Organization and Management.—Professor Case.
(d) Land Economics.—Associate Professor Stewart.

AGRONOMY

Graduate students may take work in agronomy leading to the M.S. and Ph.D. degrees. They may specialize for either degree in soil fertility, soil physics, soil biology, plant breeding, or crop production.

For either degree, if two minors are chosen, the first should be, and both first and second may be, taken in a department other than agronomy. If only one minor is chosen, it must be in a field outside of the department.

A candidate for the master's degree in agronomy must present an acceptable thesis, and show proficiency in his work as demonstrated by suitable examinations, prescribed by the department.

Fifteen college credits in agronomy and related subjects are prerequisites for a minor, and five additional credits are prerequisites for a major. Students must have had the fundamental work in science, prerequisite to the major and minor fields of study. Those with unusually good training in science may be permitted by the department to waive certain of the above mentioned requirements.

Courses for Graduates

101. Chemical Properties of Soils and Their Relation to Plant Growth.—Twice a week; first semester. *One unit.* Professor DeTurk.

104. Seminar.—Once a week; both semesters. *One-fourth unit.* (Not given in 1933-34.) The Graduate Staff.

112. Theory and Analysis of Plant Breeding Problems.—Three times a week; first semester. *One unit.* Professor Woodworth.

114. Principles Underlying the Production of Crops.—Twice a week; second semester. *One unit.* Professor Burlison, Associate Professor Dungan.

118. Research.—A special problem is chosen by each student. Graduate students writing theses should so indicate in registering in Agronomy 118. Both semesters. *One-half to four units.*

(a) Soils.—Professors Bauer, DeTurk, R. S. Smith.
(b) Crops.—Professors Burlison, Woodworth, Associate Professor Dungan.

119. Experiment Station Problems.—See Animal Husbandry 103.

Courses for Graduates and Advanced Undergraduates

7. Crop Production as Affected by Environmental Factors.—Three times a week; first semester. Professor Burlison, Associate Professor Dungan.

10. Genesis, Morphology, Classification, and Geography of Soils.—Three times a week; second semester. Professor R. S. Smith.

11. Rôle of Micro-organisms in Soil Fertility.—Three times a week; first semester. Associate Professor Sears.

13. Soil Productivity, its Variation, Modification, and Maintenance.—Three times a week; second semester. Professor Bauer.

22. Plant Genetics and Breeding.—Three times a week; second semester. Professor Woodworth, Dr. Bonnett.

29. Field Plot Technic.—Three times a week; first semester. Professor Woodworth, Mr. Mumm.

30. Metabolism of Soil Micro-organisms.—Three times a week; second semester. Associate Professor Sears.

31. Biological Methods of Soil Investigation.—Three times a week; second semester. (Not given in 1933-34.) Associate Professor Sears.

32. Physical Methods of Soil Investigation.—Three times a week; first semester. (Not given in 1933-34.) Dr. Stauffer.

33. Chemical Methods of Soil Investigation.—Three times a week; first semester. Professor DeTurk.

ANIMAL HUSBANDRY

The department of animal husbandry offers graduate work leading to the degree of Master of Science and the degree of Doctor of Philosophy. For a major or minor for the master's degree the student may specialize in the general field of animal production, or in the special fields of animal genetics, animal nutrition, animal pathology and poultry husbandry. For a major or minor for the doctor's degree he may specialize in animal genetics, the economics of meat production, animal nutrition, and animal pathology. Advanced work in poultry husbandry may be taken for a minor for the doctor's degree.

For registration for a minor in animal husbandry a student must offer at least 15 college credits in the field, including the principles of feeding, the principles of genetics, livestock production and livestock judging, and he must have had an introductory course in organic chemistry. For a major a student must offer at least 5 additional college credits in animal husbandry or in courses related to the major field of specialization. Besides these general requirements, a student must have had the special training required for effective graduate study in the field of his chosen major: For work in animal production, the economics of meat production; for work in poultry husbandry, an introductory course in farm management; for work in animal genetics, at least an introductory course in general zoology; for work in animal nutrition, a satisfactory course in quantitative chemical analysis, and preferably also a course in animal physiology; for work in animal pathology, training in histology, physiology, bacteriology, and hygiene. Attention is also directed to the advisability of including in undergraduate preparation for graduate work in any phase of animal husbandry at least introductory training in French or German and in mathematics.

In the case of students with an unusually thorough training in science who wish to pursue graduate work in some special field of animal husbandry from a non-agricultural viewpoint, the department may waive certain of the above requirements.

Students who desire to become candidates for the doctorate and who register for a minor in the general fields of animal production or the economics of meat production must take Animal Husbandry 7 and 41, if they have not taken these courses or their equivalents during their undergraduate training. Such students registering for a major in these general fields must take in addition Animal Husbandry 31, and most students so majoring will find it desirable to register in Animal Husbandry 35.

Courses for Graduates

103. Experiment Station Problems.—Organization and administration of research; objects, methods, and the sources of error in experimental work. Open to graduate students in all the departments of the College of Agriculture. Once a week; second semester. *One-half unit.* Professor Mumford.

112. Research.—Investigations along the following lines:

(a) Economic Factors Involved in Meat Production.—Professors Rusk, Carroll.

(b) Systems of Livestock Farming.—Professor Case.

(c) Animal Pathology.—Professor Graham.

(d) Animal Nutrition.—The chemistry of feeding stuffs; metabolism experiments and biochemical studies connected with the nutrition of farm animals. Professor Mitchell.

(e) Animal Genetics.—Associate Professor Roberts.

(f) Problems in Poultry Husbandry.—Professor Card.

One to three times a week; both semesters. *One-half to two units.* These courses may be taken during the summer by special permission.

117. Animal Genetics.—Two to three times a week; both semesters. *One unit.* Associate Professor Roberts.

118. Animal Nutrition Seminar.—A review of current literature in animal nutrition. Two hours a week; both semesters. *One-half unit.* Professor Mitchell.

119. Laboratory Methods in Animal Nutrition.—Two to five times a week; both semesters. *One-half to one unit.* Professor Mitchell.

120. Laboratory Methods in the Diagnosis of Animal Diseases.—Two to five times a week; both semesters. *One-half to one unit.* Professor Graham.

121. Laboratory Methods in Animal Genetics.—Two to five times a week; both semesters. *One-half to one unit.* Associate Professor Roberts.

Courses for Graduates and Advanced Undergraduates

7. Principles of Animal Nutrition.—Five times a week; first semester. Mr. Hamilton.

22. Advanced Stock Judging.—Five times a week; first semester. Members of the department.

24. Meat.—Once a week; first semester. Associate Professor Bull.

25. Beef Production.—Three times a week; first semester. Professor Rusk, Associate Professor Snapp.

26. Pork Production.—Three times a week; first semester. Professor Carroll.

27. Sheep Husbandry.—Twice a week; second semester. Assistant Professor Kammlade.

28. History of Breeds of Livestock.—Three times a week; second semester. Professor Edmonds and other members of the department.

31. Advanced Course in Animal Nutrition.—Three times a week; second semester. Professor Mitchell.

33. Horse Production.—Three times a week; second semester. Professor Edmonds, Mr. Crawford.

35. Animal Hygiene and Sanitation.—Twice a week; second semester. Professor Graham.

39. Poultry Production.—Three times a week; second semester. Professor Card.

40. Economics of Poultry Keeping.—Three times a week; first semester. Professor Card.

41. Animal Genetics.—Three times a week; second semester. Associate Professor Roberts.

ARCHITECTURE AND ARCHITECTURAL ENGINEERING

The prerequisite for graduate work in the Department of Architecture is the equivalent of the undergraduate courses required at the University of Illinois for the bachelor's degree in the department in the branches of the subjects in which registration is desired.

Courses for Graduates

101. Architectural Construction.—Theory and design. Twice a week; both semesters. *One-half to two units.* Professor Palmer.

103. Architectural Construction.—Special problems. Twice a week; both semesters. *One-half to two units.* Associate Professor Morgan.

104. Architectural Design.—Advanced course. Twice a week; both semesters. *One to three units.* Professor Deam.

105. Architectural Practice.—Research in special topics. Once a week; both semesters. *One-fourth to one-half unit.* Professor Provine.

106. Architectural History.—Special research. Twice a week; both semesters. *One-half to two units.* Professor Newcomb.

ASTRONOMY

The prerequisites for graduate study in astronomy are mathematics through calculus, a year's course in descriptive astronomy, and a course in college physics.

Courses for Graduates

101. Seminar.—Three times a week; both semesters. *One unit.* Professor Baker.

103. Celestial Mechanics.—Three times a week; both semesters. *One unit.* Professor Baker.

Courses for Graduates and Advanced Undergraduates

9. Astrophysics.—Three times a week; first semester. Professor Baker.

15. Geodetic Astronomy.—Three times a week; second semester. Professor Baker.

BACTERIOLOGY

Students electing bacteriology as a major study must have had at least 10 semester hours of bacteriology and 15 semester hours of some other physical or biological science. Before receiving a degree a student must have had work equivalent to courses 20, 8, 26, 103, and 107; candidates for the doctor's degree will be held responsible for a general knowledge of the subject as applied to plant pathology, dairy husbandry (dairy bacteriology), and soil biology. Courses in these subjects are listed under their respective departments and will be counted, after conference with adviser, toward the requirements for the doctor's degree.

In addition to the usual examinations in courses, each candidate for the master's degree will be required to pass a general written examination toward the close of the second semester of residence.

Candidates for the doctor's degree with a major study in another field than bacteriology, who elect a first or second minor in bacteriology, must offer a minimum of three units for the first minor and two and one-half units for the second minor selected from the courses offered in this department, or, for satisfactory reasons, certain courses in the departments mentioned above. These courses must include course 103 and one advanced laboratory course in the department of bacteriology.

NOTE: The attention of students is called also to courses in bacteriology offered in other departments. Certain of these courses must be elected toward requirements for advanced degrees after conference with adviser.

Courses for Graduates

103. PHYSIOLOGY OF BACTERIA.—Twice a week; first semester. *One unit.* Professor TANNER.

107. RESEARCH.—For those students who are taking a major in bacteriology either for the doctor's degree or master's degree. Both semesters. *One-half to four units.* Professor TANNER, Assistant Professor WALLACE.

118a–118b. CURRENT LITERATURE.—Required of all graduate students majoring in bacteriology. Once a week; both semesters. *One-fourth unit.* Professor TANNER.

Courses for Graduates and Advanced Undergraduates

8. FOOD BACTERIOLOGY.—Water, sewage, and food bacteria. Five times a week; second semester. Professor TANNER and assistant.

10. EPIDEMIOLOGY.—Twice a week; second semester. Assistant Professor WALLACE.

20. GENERAL BACTERIOLOGY.—For seniors and graduate students. Five times a week; both semesters. Assistant Professor WALLACE.

26. PATHOGENIC BACTERIOLOGY AND IMMUNOLOGY.—Three times a week; first semester. Assistant Professor WALLACE.

BOTANY

Candidates for advanced degrees in botany must offer for admission at least 20 hours in botany inclusive of 2a or 2b and 3, or 15 hours in botany and 5 hours in a related subject acceptable to the department. Graduate students who elect botany for minor credit must offer 15 hours of botany, or 10 hours of botany and 5 hours in a related subject acceptable to the department.

The department wishes to call the attention of graduate students to courses in agronomy and soils, bacteriology, chemistry, entomology, geography, geology, horticulture, mathematics, physics, physiology, and zoology which are available to advanced students and offer a broad foundation for the different phases of botanical work. The practical work in plant sciences in the College of Agriculture and the Experiment Station offers unusual facilities to the graduate student. Joint majors may be arranged in botany and agronomy.

Courses for Graduates

110. Botanical Discussions.—Required of all students and of members of the instructional staff. Once a week; both semesters. No credit.

112. Discussions in Plant Morphology.—Once a week; both semesters. *One-fourth unit.* Professor Buchholz.

113. Discussions in Physiology.—Once a week; both semesters. *One-fourth unit.* Professor Hottes.

117. Discussions in Pathology and Mycology.—Once a week; both semesters. *One-fourth unit.* Professor Stevens.

118. Discussions in Plant Ecology and Plant Geography.—Once a week; both semesters. *One-fourth unit.* Associate Professor Vestal.

Research Courses

120. Morphology.—Once or twice a week; both semesters. *One-half to two units.* (Botany 112 to be taken concurrently.) Professor Buchholz.

130. Physiology.—Once or twice a week; both semesters. *One-half to two units.* (Botany 113 to be taken concurrently.) Professor Hottes.

170. Pathology or Mycology.—Once or twice a week; both semesters. *One-half to two units.* (Botany 117 to be taken concurrently.) Professor Stevens.

180. Ecology or Geography.—Once or twice a week; both semesters. *One-half to two units.* (Botany 118 to be taken concurrently.) Associate Professor Vestal.

Courses for Graduates and Advanced Undergraduates

20. Cytology.—Once or twice a week; second semester. (Given in 1933-34 and in alternate years.) Professor Buchholz.

33. Physiology.—Growth, and the effect of environment on growth. Once or twice a week; first semester. Professor Hottes.

34. Physiology.—Respiration, and the effects of the environment and food on energy release. Once or twice a week; second semester. Professor Hottes.

41. Bryophytes.—Morphology and classification. Once or twice a week; second semester. (Given in alternate years; not given in 1933-34.) Dr. Hague.

43. Pteridophytes.—Comparative morphology. Once or twice a week; first semester. (Given in alternate years; not given in 1933-34.) Professor Buchholz.

44. Spermatophytes.—Comparative morphology. Once or twice a week; second semester. (Given in alternate years; not given in 1933-34.) Professor Buchholz.

45. Histology, Anatomy, and Technique.—Once or twice a week; first semester. Professor Buchholz.

46. Heredity and Evolution.—The cell in inheritance, environment, adaptation, and evolution. Once or twice a week; first semester. (Given in 1933-34 and in alternate years.) Professor Buchholz.

55. Plant Geography of North America.—Regional divisions of North America; climate, soil, topography, vegetation, vegetational history. Once or twice a week; first semester. (Given in alternate years; not given in 1933-34.) Associate Professor Vestal.

56. Plant Geography of the World.—Regional divisions and vegetation of continents other than North America. Once or twice a week; first semester. (Given in 1933-34 and in alternate years.) Associate Professor Vestal.

60. Systematic Botany.—Phylogenetic study of flowering plants. Relationship of the principal orders and families, rules of taxonomy and the identification of species. Once or twice a week; first semester. (Given in alternate years; not given in 1933-34.) Dr. Fuller.

70. Taxonomy of Pathogenic Fungi.—Myxomycetes, Bacteria, Phycomycetes and Ascomycetes. Once or twice a week; first semester. Professor Stevens.

77. Taxonomy of Pathogenic Fungi.—Basidiomycetes and Fungi Imperfecti. Once or twice a week; second semester. Professor Stevens.

80. Ecology.—Analysis of the environmental complex; responses of plants to particular factors. Once or twice a week; second semester. (Given in alternate years; not given in 1933-34.) Associate Professor Vestal.

88. Ecology.—Plant Communities. The units of vegetation and their composition and changes. Once or twice a week; second semester. (Given in 1933-34 and in alternate years.) Associate Professor Vestal.

BUSINESS ORGANIZATION AND OPERATION

Work may be done in the field of business organization and operation for a major or a minor for the M.S. degree, and for a minor for the doctorate. To do major work in this field, the student must have completed an undergraduate curriculum equivalent to that of the College of Commerce and Business Administration. To do minor work, he must have had at least five semester hours' credit in the principles of economics, also Business Organization and Operation 1 and 2 or the equivalent. Business Organization and Operation 1 is a prerequisite for 104.

Courses for Graduates

102. Marketing Policies and Problems.—Twice a week; both semesters. *One unit.* Professor Converse.

104. Scientific Management.—The history of the scientific management movement; critical study of the proposed systems. Twice a week; both semesters. *One unit.* Professor Anderson.

107. Sales Campaigns.—Twice a week; both semesters. *One unit.* Professor Russell.

129. Thesis.—Time to be arranged; both semesters. *One unit.* Professor Russell and others.

Courses for Graduates and Advanced Undergraduates

3. Retail and Wholesale Store Organization and Operation.—Three times a week; second semester. Mr. Whitlo.

4. Management in Manufacturing.—Three times a week; either semester. Professor Anderson.

7. Salesmanship.—Twice a week; either semester. Mr. Jones.

8. Advertising.—Three times a week; either semester. Professor Russell.

9. Trade and Civic Organizations.—Twice a week; second semester. Mr. Bruce.

17. Sales Management.—Twice a week; second semester. Mr. Heslip.

18. Advertising Campaigns.—Three times a week; second semester. Professor Russell.

20. Credits and Collections.—Three times a week; first semester. Mr. Huegy.

22. Marketing Policies and Problems.—Twice a week; second semester. Professor Converse.

70. Operation of Public Utilities.—Three times a week; second semester.

75. Management of Public Utilities.—Three times a week; first semester. Assistant Professor Gray.

BUSINESS LAW

Course for Graduates and Advanced Undergraduates

10. Law of Security Relations and Banking.—Three times a week; either semester. Associate Professor Dillavou.

CERAMIC ENGINEERING

Graduate work leading to the degrees of Master of Science and Doctor of Philosophy in chemistry (ceramic chemistry), and Master of Science and Doctor of Philosophy in ceramic engineering are offered by the department. Graduate students who wish to elect ceramic chemistry as their major field of study must have had the equivalent of twenty-five semester hours of chemistry and this must include satisfactory courses in general chemistry, qualitative and quantitative analysis, and either physical or organic chemistry. Such students must also have had at least one year of college physics and training in mathematics which includes calculus.

The prerequisites for graduate work in ceramics or ceramic engineering are the equivalents of the undergraduate courses required for the degrees of Bachelor of Science in ceramics or ceramic engineering according to the branch of the subject in which registration is desired.

Candidates for the degree of Doctor of Philosophy with their major field of study in ceramic chemistry must fulfill the same general requirements in chemistry as candidates in other branches of chemistry.

Courses for Graduates

101. The Chemistry of the Compounds of Silicon.—Both semesters. *One unit.* Professor Parmelee.

102. General Technology of the Clay Industries.—Both semesters. *One to two units.* Professors Parmelee, Hursh, Andrews.

103. Chemistry of Silicates.—Laboratory to supplement Ceramic Engineering 101, which must precede or accompany it. Both semesters. *One to two units.* Professor Parmelee.

104. Technology of Glass.—Second semester. *One to two units.* Professor Parmelee.

105. Methods of Ceramic Research.—Second semester. *One unit.* Professor Parmelee.

106. Research.—Professors Parmelee, Hursh, Andrews.

Courses for Graduates and Advanced Undergraduates

5. Ceramic Bodies.—Five times a week; first semester. Professor Parmelee.

7. Structural Clay Products.—Three times a week; first semester. Professor Andrews.

8. Glass Technology.—Twice a week; second semester. Professor Parmelee.

10. Cements.—Twice a week; second semester. Professor Andrews.

11. Drying Clay Products.—Three times a week; second semester. Professor Hursh.

14. Glasses and Glazes.—Three times a week; second semester. Professor Parmelee.

16. Enamels.—Three times a week; first semester. Professor Andrews.

18. Ceramic Microscopy.—Three times a week; first semester. Mr. Thompson.

20. Refractory Materials.—Twice a week; second semester. Professor Andrews.

22. Kilns and the Burning of Clay Products.—Three times a week; first semester. Professor Hursh.

23. Dryer and Kiln Design.—Twice a week; first semester. Professor Hursh.

24. Ceramic Engineering Design.—Three times a week; second semester. Professor Hursh.

28. Pyrochemical Problems.—Twice a week; second semester. Professor Andrews.

CHEMISTRY

Graduate students whose major subject is in some department other than chemistry, before taking graduate work for credit in this department, must have had the equivalent of 15 university credits in chemistry, and the ground covered should include satisfactory work in general chemistry and in qualitative and quantitative analysis and elementary organic chemistry. Such students are advised to make selections from the following courses: Chemistry 40, 41, 42, 43, 27, 36b and 37b, 50a, 60a, 15a, 16a and 97b. Courses of a more special nature will not as a rule be accepted for graduate work unless preceded by one of the courses above. Graduate students who are candidates for an advanced degree in chemistry must have had the equivalent of 25 university credits in chemistry properly distributed.

Graduate students whose major subject is in some department other than chemistry and who intend to take a first minor in chemistry or any branch of chemistry toward the Ph.D. degree must include among the courses taken, Chemistry 40 and 41, or must have had the equivalent.

Graduate students who are candidates for the A.M. or M.S. degree in chemistry must include in the courses taken Chemistry 40 and 41 or must have had the equivalent. Graduate students who are candidates for the Ph.D. degree in any branch of chemistry must include among their courses Chemistry 40, 41, 42, and 43 or must have had the equivalent.

Students who intend to take graduate work in chemistry should include in their undergraduate preparation at least the equivalent of one full year of physics, one year of French, one year of German, mathematics through differential and integral calculus. Any student without these subjects may enter the Graduate School but will be required to spend part of his time in residence on the above-mentioned subjects.

Courses for Graduates

Inorganic Chemistry

101a–101b. Inorganic Chemistry.—The less familiar elements and their relationship in the periodic system. Lectures; recitations. Twice a week; both semesters. *One-half unit.* Professor Hopkins.

102a–102b. Inorganic Chemistry.—(Laboratory.) Inorganic preparations and qualitative analysis of the less familiar elements. To accompany or follow Chemistry 101a–101b. One to three times a week; both semesters. *One-fourth to three-fourths unit.* Professor Hopkins.

105a–105b. Inorganic Chemistry. — (Seminar and Special Topics.) Current literature; special topic for 1933-34: First semester, Mechanism of Reactions. (Dr. Copley). Second semester, Structure of Inorganic Molecules. (Dr. Bailar.) One, two, or three times a week; both semesters. *One-fourth to one unit.* Professor Hopkins.

Qualitative and Quantitative Analysis

123a. Qualitative Analysis.—The principles and methods of analytical chemistry; theory of solutions. Lectures. Twice a week; first semester. *One-half unit.* Associate Professor Reedy.

123c. Qualitative Analysis.—Laboratory work, optional, to accompany Chemistry 123a. One to three times a week; first semester. *One-fourth to three-fourths unit.* Associate Professor Reedy.

124b. Quantitative Analysis.—A modern survey of advanced principles, calculations, experimental methods and applications. Lectures. Twice a week; second semester. *One-half unit.* Associate Professor Reedy.

124d. Quantitative Analysis.—Laboratory work, optional, to accompany Chemistry 124b. One to three times a week; second semester. *One-fourth to three-fourths unit.* Associate Professor Reedy.

125a–125b. Quantitative Analysis.—(Seminar). Special topics in analytical chemistry. (Required of all students taking a major or minor in analytical chemistry.) One to three times a week; both semesters. *One-fourth to one unit.* Professor Clark.

126a. Quantitative Instrumental and Chemical Methods of Analysis in Organic Chemical Research.—(Ultimate bomb analysis, gas density, polarimetry, refractometry, spectrophotometry, colorimetry, miscroscopy, etc.) Lectures. Twice a week; first semester. *One-half unit.* Professor Clark, Assistant Professor Englis.

126c. Quantitative Instrumental and Chemical Methods of Analysis in Organic Chemical Research.—Laboratory work, optional, to accompany Chemistry 126a. One to three times a week; first semester. *One-fourth to three-fourths unit.* Professor Clark, Assistant Professor Englis.

127a–127b. Modern Applications of Radiation in Chemical and Industrial Problems. — (X-rays, radioactivity, optical spectroscopy.) Lectures. Twice a week; both semesters. *One-half unit.* Professor Clark.

127c–127d. Modern Applications of Radiation in Chemical and Industrial Problems.—Laboratory, optional, to accompany Chemistry 127a-127b. One to three times a week; both semesters. *One-fourth to three-fourths unit.* Professor Clark.

Organic Chemistry

132a. Organic Chemistry.—(First course.) Review of the general reactions in organic chemistry: Problems. Twice a week; first semester. *Three-fourths unit.* Professor Fuson.

133b. Organic Chemistry.—Optical isomerism; geometric isomerism; tautomerism, etc. Twice a week; second semester. *Three-fourths unit.* Professor Adams.

134. Organic Chemistry.—(Laboratory.) Advanced preparations are selected to meet the needs of each individual in the course. Two to four times a week; both semesters. *One-half to one unit.* Professors Marvel, Fuson.

135a–135b. Organic Chemistry.—(Seminar.) Current literature. (Required of all students majoring in organic chemistry.) Once a week; both semesters. *One-fourth unit.* Professor Adams.

136a. Organic Chemistry.—Special topics. Twice a week; first semester. *Three-fourths unit.* Associate Professor Shriner.

Physical Chemistry

145a–145b. Physical Chemistry.—(Seminar.) Recent development in physical chemistry. Twice a week; both semesters. *Three-fourths unit.* Professor Rodebush and staff.

Physiological Chemistry

150b. Physiological Chemistry.—Chemistry of intermediary metabolism. Lectures; discussions; readings. Twice a week; second semester. *Three-fourths unit.* Professor Rose.

152a–152b. Physiological Chemistry.—Difficult biochemical preparations; chiefly laboratory. One to five times a week; both semesters. *One-half to one unit.* Professor Rose.

155a–155b. Physiological Chemistry.—(Seminar.) Current literature. (Required of all students majoring in physiological chemistry.) Twice a week; both semesters. *Three-fourths unit.* Professor Rose.

Chemical Engineering

160a–160b. Advanced Chemical Technology, and Chemical Engineering.—Recent developments in the chemical industry. Lectures. Twice a week; both semesters. *One-half unit.* Professor Keyes.

161a–161b. Chemical Plant Design.—Calculations and layout of equipment for recently developed processes. Twice a week; both semesters. *One-half unit.* Associate Professor Krase.

Sanitary Chemistry

186a–186b. Sanitary Chemistry.—Special problems and new developments in sanitary chemistry. Twice a week; both semesters. *One-half to one and one-fourth units.* Professor Buswell.

Miscellaneous

190a–190b. Research.—A thesis is usually required of students taking the master's degree and is always required of students taking the degree of

Doctor of Philosophy. Both semesters. Work may be taken in the following subjects:

Physical and Electrochemistry.—Professor Rodebush, Associate Professor Phipps, Dr. Copley.

Inorganic Chemistry.—Professor Hopkins, Associate Professor Reedy, Drs. Audrieth, Bailar, Stillwell, Copley, Quill.

Analytical Chemistry.—Professor Clark, Associate Professor Reedy, Assistant Professors Englis, Smith.

X-ray Chemistry.—Professor Clark, Dr. Stillwell.

Food Chemistry.—Assistant Professor Englis.

Phyto-Chemistry.—Assistant Professor Englis.

Organic Chemistry.—Professors Adams, Marvel, Fuson, Associate Professor Shriner, Dr. Bailar.

Sanitary Chemistry.—Professor Buswell.

Zymo-Chemistry.—Professor Buswell.

Physiological Chemistry.—Professor Rose.

Chemical Engineering.—Professor Keyes, Associate Professor Krase, Assistant Professor Kistler.

Ceramic Chemistry.—Professor Parmelee.

Courses for Graduates and Advanced Undergraduates

Inorganic Chemistry

15a. Inorganic Chemistry.—The common elements; periodic relationship; preparation and application of the common elements and compounds. Lectures; recitations. Twice a week; first semester. Dr. Quill.

16a. Inorganic Chemistry.—(Laboratory.) Preparation of the less easily produced inorganic compounds. Twice a week; first semester. Dr. Audrieth.

Qualitative and Quantitative Analysis

27. Special Methods and Instruments in Quantitative Analysis.—Four times a week; both semesters. Assistant Professor Smith.

Organic Chemistry

36b. Organic Chemistry.—(Second course.) Three times a week; second semester. Professor Marvel.

37b. Organic Chemistry.—(Laboratory.) (Second course.) Organic synthesis. To accompany Chemistry 36b. Twice a week; second semester. Professor Fuson.

38a. Qualitative Organic Analysis.—Identification of pure organic compounds and mixtures. Twice a week; first semester. Professor Marvel.

Physical Chemistry

40. Elementary Physical Chemistry.—Three times a week; both semesters. Professor Rodebush, Associate Professor Phipps.

41. Elementary Physical Chemistry.—(Laboratory.) To accompany Chemistry 40. Once a week; both semesters. Professor Rodebush, Associate Professor Phipps and assistants.

42. Elementary Physical Chemistry.—Three times a week; both semesters. Associate Professor Phipps.

43. Elementary Physical Chemistry.—(Laboratory.) Once a week; both semesters. Associate Professor Phipps and assistants.

44a–44b. Advanced Physical Chemistry.—Thermodynamics and free energy calculations. Atomic structure. Twice a week; both semesters. Professor Rodebush, Dr. Copley.

49b. Chemistry of Colloids.—Preparation and properties of colloids. Special apparatus and technique employed in colloid chemistry. Three times a week; second semester. Professor Buswell.

Physiological Chemistry

50a. Physiological Chemistry.—Proteins, fats, and carbohydrates; tissues, digestion, intestinal putrefaction, and feces; quantitative analysis of gastric contents, blood, milk, and urine. Lectures; laboratory. Five times a week; first semester. Professor Rose and assistants.

51b. Problems of Metabolism.—Micro-methods of blood and urine analysis, and their application. Lectures; laboratory. Three times a week; second semester.

Chemical Engineering

60a. Chemical Technology.—The survey of important processes and recent developments in the chemical industry; inspection trip. (Estimated cost of this trip is $30 to $35 per student.) Laboratory. Four times a week; first semester. Assistant Professor Kistler.

61a.–61b. Principles of Chemical Engineering.—The application of scientific principles to the unit operations of chemical engineering. Lectures; laboratory. Four times a week; both semesters. Associate Professor Krase, Assistant Professor Kistler, Mr. Howard.

62a–62b. Principles of Research and Development.—The fundamental methods used in the research and development departments in chemical industry; also economic problems. Twice a week; both semesters. Professor Keyes.

63b. Fuels and Their Combustion.—Three times a week; second semester. Mr. Howard.

64b. High Pressure Reactions.—Technique and calculations. Twice a week; second semester. Associate Professor Krase.

65b. Industrial Calculations.—Three times a week; second semester. Assistant Professor Kistler.

71a. Sampling, Grinding, and Mixing.—Principles and calculations. Once a week; first semester. (Not given in 1933-34.) Mr. Howard.

73a. Metallurgy.—Manufacture of iron and steel. Three times a week; first semester. Mr. Howard.

74b. Metallurgy and Metallography.—General metallurgy of iron and steel; physical characteristics and microstructure of metals and alloys. Lectures; laboratory. Three times a week; second semester. Mr. Howard.

Sanitary Chemistry

86a. Chemistry of Sanitation.—Lectures, demonstrations, and field trips covering the field of water purification, sewage treatment, and general sanitation. Three times a week; first semester. Professor Buswell.

Miscellaneous

92a. Chemical Literature and Reference Work.—Once a week; first semester. Dr. Bartow.

95a. History of Science with Particular Reference to Chemistry.—Lectures; reading. Twice a week; first semester. Dr. Bartow.

97b. Food Analysis.—Quantitative organic analysis of food products; alcohols, carbohydrates, fats and oils, cereals, nitrogenous bodies, preservatives, and colors. Six times a week; second semester. Assistant Professor Englis.

CIVIL ENGINEERING

The prerequisite for graduate work in civil engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in civil engineering in the branches of the subject in which registration is desired.

Courses open to junior and senior students are open for minor credit to students majoring in other departments.

See also Theoretical and Applied Mechanics and Railway Engineering.

Courses for Graduates

101. Water Supply. — Twice a week; first semester. *One unit.* Professor Babbitt.

102. Sewerage.—Twice a week; second semester. *One unit.* Professor Babbitt.

103. Highway Engineering.—Twice a week; first semester. *One unit.* Professor Crandell.

104. Municipal Engineering.—Twice a week; second semester. *One unit.* Professor Crandell.

105. Reinforced Concrete Theory.—Twice a week; first semester. *One unit.* Professor Cross.

106. Reinforced Concrete Structures.—Twice a week; first semester. *One unit.* Professor Cross.

107. Statically Indeterminate Structures.—Twice a week; first semester. *One unit.*

108. Bridge Design.—Twice a week; second semester. *One or two units.* Professor Cross.

109. Water Purification and General Sanitation.—Twice a week; first semester. *One unit.* Professor Babbitt.

110. Sewage Disposal, Wastes Disposal, and General Sanitation.—Twice a week; second semester. *One unit.* Professor Babbitt.

112. Masonry Construction.—Twice a week; second semester. *One-half to one and one-half units.* Professor Huntington.

113. Foundations.—Once a week; first semester. *One-half unit.* Professor Huntington.

124. Steel Building Design.—Twice a week; first semester. *One unit.* Professor Huntington.

125. Design of Industrial Structures.—Twice a week; second semester. *One unit.* Professor Ketchum.

130. Hydrology.—Twice a week; first or second semester. *One unit.* Professor Pickels.

131. Water Power.—Twice a week; second semester. *One unit.* Associate Professor Doland.

140. Research.—First or second semester. *One-half to two units.* Members of the department.

198. Thesis.—First or second semester. *One to two and one-half units.* Members of the department.

Courses for Graduates and Advanced Undergraduates

67. Statically Indeterminate Structures.—The elastic theory and its applications in statically indeterminate structures. Three times a week; first semester. Professor Cross.

68. Statically Indeterminate Structures. — A continuation of course 67. Three times a week; second semester. Professor Cross.

THE CLASSICS

The Degree of Master of Arts in the Classics.—The major may be either Latin or Greek.

The Degree of Doctor of Philosophy in the Classics.—The degree is given in classical philology. Major work may be taken in either Latin or Greek, but whichever language is taken as a major, the other must be taken as a first minor.

GREEK

Preparation for first-year graduate work in Greek must include at least two years of preparatory Greek, two years of college Greek, and two years of college Latin. A reading knowledge of French and German is important for candidates in this subject. The study of history and philosophy is especially recommended.

Courses for Graduates

106a. Greek Drama, Tragedy.—Twice a week; first semester. *One unit.* Associate Professor Perry.

122. Lucian and His Age.—Twice a week; second semester. *One unit.* Associate Professor Perry.

110. Bibliography and Criticism.—(Thesis course; the same as Latin 110.) Once a week; both semesters. *One unit.* Professors Oldfather, Canter, Associate Professor Perry.

Courses for Graduates and Advanced Undergraduates

6. Thucydides and Plato.—Three times a week; first semester. Associate Professor Perry.

8. Greek Oratory, Aristotle, and Theocritus.—Three times a week; second semester. Associate Professor Perry.

14. Greek Composition.—Once a week; second semester. Associate Professor Perry.

18. Greek Archaeology.—Twice a week; first semester. Mr. Rapp.

LATIN

Preparation for first-year graduate work in Latin must include at least two years of preparatory Latin and four years of college Latin. A reading knowledge of French and German is important. Some acquaintance with Greek is highly desirable, and the study of history and philosophy is especially recommended.

Courses for Graduates

106. Terence.—Twice a week; first semester. *One unit.* Professor Oldfather.

107. Latin Epigraphy.—Twice a week; first semester. *One unit.* Professor Canter.

109. Vergil.—Twice a week; second semester. *One unit.* Professor Canter.

110. Bibliography and Criticism.—(Thesis course; the same as Greek 110.) Once a week; both semesters. *One unit.* Professors Oldfather, Canter, Associate Professor Perry.

118. The Latin Romance.—Twice a week; second semester. *One unit.* Associate Professor Perry.

Courses for Graduates and Advanced Undergraduates

18. Roman Archaeology.—Twice a week; second semester. Mr. Rapp.

21. Tacitus *(Annales)* and Juvenal.—Three times a week; first semester. Professor Canter.

22. Martial, Suetonius, and Apuleius.—Three times a week; second semester. Professor Canter.

10. Composition.—Twice a week; second semester. Associate Professor Perry.

DAIRY HUSBANDRY

The graduate student may major in dairy husbandry for the degree of Master of Science or Doctor of Philosophy.

Candidates for advanced degrees in dairy husbandry must have had adequate training in collegiate courses in dairy husbandry. In addition, depending upon his field of specialization, the student should have had courses in the following subjects: chemistry, bacteriology, physics, economics, zoology, genetics, and mathematics.

For either degree a first minor must be taken outside the department, preferably outside the college. If a second minor is elected it may with proper approval be chosen in the department.

Courses for Graduates

101. Economic Milk Production.—Twice a week; both semesters. *One-half to two units.* Professor Fraser.

105. Dairy Manufactures.—Both semesters. *One-half to two units.* Professor Ruehe, Associate Professor Tracy.

106. Dairy Bacteriology.—Research on assigned problems. Both semesters. *One-half to two units.* Professor Prucha.

107. Dairy Chemistry.—Assigned problems. Both semesters. *One-half to two units.* Assistant Professor Overman.

108. Physiology of Lactation.—Once a week; both semesters. *One-half to two units.* Professor Gaines.

112. Research.—Graduate students writing theses should so indicate in registering in Dairy Husbandry 112. Both semesters. *One to four units.* Special problems along the following lines:

(a) Dairy Bacteriology.—Professor Prucha.

(b) Dairy Chemistry.—Assistant Professor Overman.

(c) Dairy Cattle Breeding.—Professor Yapp.

(d) Dairy Cattle Feeding.—Associate Professor Nevens.

(e) Milk Production.—Professor Gaines.

(f) Dairy Manufactures.—Professor Ruehe, Associate Professor Tracy.

113. Seminar.—Current literature in dairy bacteriology, dairy chemistry and dairy manufactures. Once a week; both semesters. *One-half unit.* Members of the Graduate Staff.

114. Seminar.—Current literature in biology of milk production. Once a week; both semesters. *One-half unit.* Professor Gaines.

Courses for Graduates and Advanced Undergraduates

4. Ice Cream Making.—Four times a week; first semester. Associate Professor Tracy.

5. Composition of Dairy Products.—Three times a week; second semester. Assistant Professor Overman.

7. Creamery Buttermaking and Factory Management.—Five times a week; second semester. Professor Ruehe, Mr. Tuckey.

8. Fluid Milk Plant Operations.—Three times a week; second semester. Associate Professor Tracy, Mr. Ramsey.

10. Dairy Bacteriology.—Three times a week; first semester. Professor Prucha, Assistant Professor Brannon.

14. Milk Condensing.—Three times a week; second semester. Associate Professor Tracy.

17. Advanced Study of Dairy Breeds.—Three times a week; first semester. Professor Yapp.

20. Economic Problems in Dairy Farming.—Three times a week; first semester. Professor Fraser.

21. Systems of Dairy Farming.—Three times a week; second semester. Professor Fraser.

25. Advanced Dairy Cattle Feeding.—Twice a week; first semester. Associate Professor Nevens.

ECONOMICS

Every student entering on major graduate work in economics must have had a course in the principles of the science and also in some special part of the field such as public finance or money and banking. The work must represent at least eight semester hours. He must have had at least one semester's work in English, American, or general European history, and at least three hours in political science.

Those who take the subject as a minor must have had a course of at least five semester hours in the principles.

Graduate students who are making economics their major are required during their first year to acquaint themselves with the works of the masters in the science, by taking either course 101 or 103. In the same or subsequent year they are expected to elect the fundamental courses in some other divisions of the field of economics. One of the minors for the doctor's degree may be taken in a separate division of economics; the other must be taken out of the department, and preferably outside of the College of Commerce.

The following courses may be taken by students in general economics for major or minor credit; all numbered above 100; 4, 10, 11, 13, 14, 15, 17, 24, 25, 29, 30, 41, 42, 43, 44, 51, 52, 55, 61, 71, 72, 81. The following may be taken for minor credit only: 8, 9, 31, 36, 56, 82.

Two units will be accepted for a first minor for the master's degree; and four two- or three-hour graduate courses, or their equivalent in advanced undergraduate courses, for a first minor for the doctor's degree.

Courses in transportation may be included in their programs by students of economics as part of their major; courses in agricultural economics, transportation, accountancy, and business organization and operation may be used

to satisfy the requirements for the minor. See Business Organization and Operation, Transportation, and Agricultural Economics.

Courses for Graduates

101. Economic Theory.—Twice a week; both semesters. *One unit.* Professor Weston.

102. Theory and History of Money, Credit, and Prices.—Twice a week; both semesters. *One unit.* Assistant Professor Wasserman.

103. The Distribution of Wealth.—Twice a week; both semesters. *One unit.* Professor Weston.

104a. Theories and Policies of International Trade.—Twice a week; first semester. *One unit.* Professor Litman.

104b. Organization of International Trade.—Twice a week; second semester. *One unit.* Professor Litman.

105. Public Finance.—Twice a week; both semesters. *One unit.* Professor Hunter.

106. International Exchange and the Money Markets.—Twice a week; second semester. *One unit.* Associate Professor Wright.

107. The Corporation in Economic Evolution.—Twice a week; both semesters. *One unit.* Assistant Professor Brown.

109. Comparison of the Theory and Practice of the Leading Central and Reserve Banks with Special Reference to England, Germany, France, and the United States.—Twice a week; first semester. *One unit.* Associate Professor Wright.

110a. Finance and Investments: Fundamental Principles Applied to Business Units of a Simple Character.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.)

112. Labor Problems.—Twice a week; both semesters. *One unit.* Associate Professor Berman.

This course is arranged in a two-year cycle:

1933-34: First semester, Wages and Unemployment; second semester, Labor and the Law.

1934-35: Social Aspects of Labor; both semesters.

118. Seminar.—Thesis course. (All graduate students writing theses in economics must register in Economics 118; registration for other students is optional.)

(a) Third Year: Seminar.—Professor Weston.

(b) First Year: General Economics.—Assistant Professor Brown.

(d) First Year: Public Utilities.—Assistant Professor Gray.

120. History of Economic Thought.—Twice a week; both semesters. *One unit.* Professor Weston.

122. Economic History of the United States.—Twice a week; both semesters. *One unit.* Professor Bogart.

123. Industrial and Financial Organization of Society.—Twice a week; both semesters. *One unit.* Professor Lee.

143. The Administration of Industrial Relations.—Twice a week; both semesters. *One unit.* Dr. Helbing.

144. Business Cycles.—Twice a week; both semesters. *One unit.* Assistant Professor Dickinson.

180. Management of Public Utilities.—Twice a week; both semesters. *One unit.* Assistant Professor Gray.

See also Mathematics 129.—Theory of Statistics.

Courses for Graduates and Advanced Undergraduates

4. History of Money and Banking Institutions, with Particular Reference to the United States.—Three times a week; first semester. Professor Lee.

8. Foreign Exchange and the Money Market.—Three times a week; second semester. Associate Professor Wright.

9. Advanced Theory and Practice of Banking.—Three times a week; first semester. Associate Professor Wright.

10. Corporation Finance and Management.—Three times a week; second semester. (Not given in 1933-34.)

11. Industrial Consolidation. — Development; plans for controlling trusts. Three times a week; first semester. Assistant Professor Brown.

23. Economic Problems.—Three times a week; second semester. Professor Lee.

24. Economic Development of Modern Europe.—Three times a week; second semester. Professor Bogart.

25. Economic History of England.—Three times a week; first semester. Professor Bogart.

29. International Commerce and Commercial Policies.—Three times a week; second semester. Professor Litman.

30. World Markets.—Three times a week; second semester. Professor Litman.

31. Organization of International Commerce.—Three times a week; first semester. Professor Litman.

36. Investments.—Three times a week; second semester. Assistant Professor Brown.

41. Labor Problems.—Three times a week; first semester. Associate Professor Berman.

42. Trade Unionism.—Three times a week; second semester. Associate Professor Berman.

43. Personnel Administration.—Three times a week; second semester. Dr. Helbing.

44. Socialism and Economic Reform.—Three times a week; first semester. Dr. Helbing.

51. Public Finance.—Three times a week; first semester. Professor Hunter.

52. Problems in Taxation, with Special Reference to Illinois.—Three times a week; second semester. Professor Hunter.

55. Economics of Insurance (Life).—Three times a week; first semester. Assistant Professor Dickinson.

56. Economics of Insurance (Property).—Three times a week; second semester. Assistant Professor Dickinson.

58. Urban Land Economics.—Three times a week; first semester. Assistant Professor Dickinson.

61. Economic Theory.—Three times a week; both semesters. Assistant Professor Wasserman.

71. Economic Statistics.—Three times a week; first semester. Assistant Professor Dickinson.

72. Economic Statistics (Business Barometers).—Three times a week; second semester. Assistant Professor Dickinson.

81. Principles of Public Utilities.—Three times a week; first semester. Assistant Professor Gray.

82. Regulation of Public Utilities.—Twice a week; second semester. Associate Professor Dillavou.

83. Public Utility Rates.—Three times a week; second semester. Assistant Professor Gray.

EDUCATION

For a master's degree in education, Education 125 is required. For students who have not taken a course in the history of education as undergraduates, Education 11 or Education 30 is required.

Education 6 and 25, or their equivalents, are required as prerequisites for all graduate courses.

Courses for Graduates

101. Philosophy of Education.—Twice a week; second semester. *One unit.* Professor Cameron.

102. Research in History of American Education.—Once a week; two hours; both semesters. *One unit.* Professor Seybolt.

104. Educational Administration.—Twice a week; both semesters. *One unit.* Associate Professor Weber.

106. High School Administration.—Once a week; two hours; first semester. *One unit.* Professor Clement.

120a. Supervision of Secondary Education.—Once a week; two hours; second semester. *One unit.* Professor Clement.

121. Educational Measurement.—Once a week; two hours; second semester. *One unit.* Associate Professor Odell.

123. Educational Statistics.—Once a week; two hours; first semester. *One unit.* Associate Professor Odell.

124. Readings in Educational Research.—Once a week; two hours; both semesters. *One unit.* Professor Monroe.

125. Educational Psychology.—Once a week; two hours; both semesters. *One unit.* Professor Cameron.

127. High-School Curricula.—Once a week; two hours; first semester. *One unit.* Professor Clement.

128. Junior High School.—Twice a week; first semester. *One unit.* Professor Clement.

129. The Junior College.—Once a week; two hours; second semester. *One unit.* Professor Clement.

131. Analysis and Evaluation of High School Texts.—Once a week; two hours; second semester. *One unit.* Professor Clement.

147. Psychology of Elementary School Subjects.—Once a week; two hours; first semester. *One unit.* Professor Cameron.

150. Thesis.—Both semesters. *One or two units.* Dean Benner and others.

164. Public School Finance.—Once a week; two hours; second semester. *One unit.* Associate Professor Weber.

170. Public School Business Administration.—Once a week; two hours; second semester. *One unit.* Associate Professor Weber.

184. Seminar in School Administration.—Once a week; two hours; second semester. *One unit.* Associate Professor Weber.

185. Seminar in Educational Psychology.—Once a week; two hours; both semesters. *One unit.* Professor Cameron.

190. Seminar in Educational Research.—Once a week; two hours; second semester. *One unit.* Dean Benner and others.

Courses for Graduates and Advanced Undergraduates

11. Ancient and Medieval Education.—Twice a week; first semester. Professor Seybolt.

18. Educational Measurements.—Three times a week; both semesters. Associate Professor Odell.

21. Supervision of Elementary Education.—Three times a week; first semester. Mr. Browne.

30. History of American Education.—Twice a week; second semester. Professor Seybolt.

40. Trends in Elementary Education.—Three times a week; first semester. Assistant Professor Dolch.

41. Vocational Education.—Three times a week; first semester. Professor Mays.

42. Special Education.—Twice a week; first semester. (Not given in 1933-34.) Assistant Professor Dolch.

43. Mental Tests.—Three times a week; second semester. Professor Cameron.

44. Laboratory Problems in Learning.—Three times a week; second semester. Professor Cameron.

45. Genetic Psychology for Teachers.—Three times a week; both semesters. Associate Professor Griffith.

50. Psychology of the Pre-School Child.—Three times a week; first semester. Associate Professor Griffith.

53. Problems of Industrial Education.—Three times a week; both semesters. Professor Mays.

54. Functions and Methods of the Part-time School.—Twice a week; first semester. Professor Mays.

54a. Curriculum and Administration of the Part-time School.—Twice a week; second semester. Professor Mays.

55. Vocational Guidance.—Three times a week; second semester. Professor Mays.

ELECTRICAL ENGINEERING

The prerequisite for graduate work in electrical engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in electrical engineering in the branches of the subject in which registration is desired.

Graduate students who wish to take a minor in electrical engineering must have had differential and integral calculus, and one year's work in college physics.

Courses offered to junior and senior students in electrical engineering are open for minor credit to students majoring in other departments who have the proper prerequisites.

Courses for Graduates

101. Advanced Courses in Alternating Currents.—(A) Graduate Seminar; (B) Circuit Transients; (C) Machine Transients; (D) Symmetrical Components. Both semesters. *One-half to two units.* Professor Paine, Associate Professor Knight, Assistant Professors Kraehenbuehl, Keener.

102. Electric Waves, Oscillations, and Transients.—(A) Theory of Electric Waves, Oscillations, and Transients; (B) Demonstration Lecture; (C) Theory of Energy Radiation; (D) Principles of Television Engineering. Both semesters. *One-half to two units.* Assistant Professors Reich, Brown.

103. Electric Design.—(A) Power Plant Design; (B) Machine Design; (C) Illumination Practice and Design. Twice a week; both semesters. *One unit.* Associate Professor Waldo, Assistant Professor Kraehenbuehl.

104. Courses in Electronics.—(A) Theoretical Electronics; (B) Vacuum Tubes and Amplifiers; (C) Photoelectric Cells, Gaseous Control Tubes, and Inverters. Three times a week; both semesters. *One unit.* Assistant Professor Reich.

105. Electrical Engineering Research.—(A) Special Problems; (B) Thesis; both semesters. *One to three units.* Professors Paine, Tykociner; Associate Professors Waldo, Knight; Assistant Professors Brown, Reich, Keener, Kraehenbuehl.

ENGLISH LANGUAGE AND LITERATURE

Students who enter on graduate work with English as their major subject are required to give evidence of their ability to write good English. They must present the equivalent of fourteen hours of undergraduate work in English literature, the required college work in rhetoric, and the equivalent of four semesters of college work in Latin, or in Greek, or in French, or in German. After the first year of graduate work a knowledge of French and German is indispensable.

Students making English their minor may be admitted to such courses as in the judgment of the instructor in charge they are qualified to pursue.

The Degree of Master of Arts in English.—In addition to complying with the general rules of the Graduate School, candidates for the degree of Master of Arts in English must comply with the following rules of the Department of English: (1) They must choose a portion of their work from the group of courses described as "for graduates;" (2) must offer an elementary course in Anglo-Saxon; and (3) must take besides the regular semester examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Master of Arts in Speech.—Candidates for the degree of Master of Arts in Speech must comply with the following regulations: (1) They must satisfy the general requirements of the Department of English for admission to graduate work; (2) must offer a minor in English of not less than two units selected from the 100 courses in English literature; (3) must take, besides the regular examinations in all their courses, a general examination, oral or written as the department may prescribe, which shall be a final test of the candidate's fitness and ability.

The Degree of Doctor of Philosophy in English.—Candidates for the degree of Doctor of Philosophy in English may expect to be examined on the entire field of the English language and literature. They are urged, furthermore, to acquaint themselves as fully as possible with the history and philosophy of the period in which their main interest lies, and with the foreign languages and literature most closely related to English and that period.

Courses for Graduates

101. Research in Special Topics.—*One or two units.* Professors Graham, Bernbaum, Flom, Paul, Zeitlin, E. C. Baldwin, T. W. Baldwin, Jones, Hillebrand, Jefferson; Associate Professors Sandford, Parry, Fletcher; Assistant Professors Rinaker, Secord, Finney.

110. Old English (Anglo-Saxon) Poetry.—Twice a week; first semester. *One unit.* Professor Flom.

114. The Development of the Essay.—The English essay; classical origins; continental influences. Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Zeitlin.

128. Literature of the Sixteenth Century.—Twice a week; both semesters. *One unit.* Professor Jones.

130. Tragedy.—Twice a week; both semesters. *One unit.* Professor Hillebrand.

135. Problems in American Literature: The American Essay.—Twice a week; both semesters. *One unit.* Professor Paul.

137. Prose Writers of the Nineteenth Century.—Twice a week; both semesters. *One unit.* Professor Zeitlin.

138. The Romantic Movement.—Twice a week; both semesters. *One unit.* (To receive credit, a student must take both semesters.) Professor Bernbaum.

140. Investigations in Modern English Literature.—(For second-year and third-year graduate students who are preparing theses for the doctor's degree.) Once a week; three hours; both semesters. *One to three units.* (May be taken in successive years.) Professor Bernbaum.

141. Literature of the Seventeenth Century.—Twice a week; both semesters. *One unit.* Professor E. C. Baldwin.

143. History and Theory of Prose Fiction.—Once a week; two hours; both semesters. *One unit.* (To receive credit, a student must take both semesters.) Professor Bernbaum.

145. Studies in Eighteenth Century Literature.—Twice a week; both semesters. *One unit.* Professor Graham.

147. Shakespeare and Elizabethan Drama.—Critical study of the chief plays. Twice a week; both semesters. *One unit.* Professor T. W. Baldwin.

149. The Development of Tudor Drama.—Twice a week; both semesters. *One unit.* Professor T. W. Baldwin.

157. Seminar in Spenser.—Twice a week; second semester. *One unit.* Professor Jones.

Courses for Graduates and Advanced Undergraduates

8. Old English (Anglo-Saxon).—Three times a week; first semester. Professor Flom.

9. Beowulf.—Three times a week; second semester. Professor Jones.

17. History of the English Language.—Three times a week; second semester. Professor Flom.

25. Chaucer.—Three times a week; first semester. Professor Jones.

26. Spenser.—Three times a week; first semester. Professor Jones.

29. English Literature from 1557 to 1688 (Exclusive of the Drama).—Three times a week; first semester. Professor E. C. Baldwin.

31. English Literature from 1688 to 1789 (Exclusive of the Drama).—Three times a week; second semester. Assistant Professor Secord.

33. English Literature from 1789 to 1837.—Three times a week; second semester. Assistant Professor Secord.

34. Dr. Johnson and His Circle.—Three times a week; first semester. Assistant Professor Rinaker.

35. The English Drama (Previous to Shakespeare).—Three times a week; first semester. Professor Hillebrand.

36. The English Drama (Exclusive of Shakespeare) from 1600 to 1700.—Three times a week; second semester. Professor Hillebrand.

38. The Arthurian Tradition.—Three times a week; second semester. Associate Professor Parry.

39. Introduction to Medieval Literature.—Three times a week; first semester. Associate Professor Parry.

50. Prose of the First Half of the Seventeenth Century.—Three times a week; second semester. Professor Zeitlin.

52. The Great Novelists of the Nineteenth Century.—Three times a week; first semester. (Not given in 1933-34.) Professor Bernbaum.

53. Modern American Criticism.—Three times a week; second semester. (Not given in 1933-34.) Professor Zeitlin.

54a–54b. Introduction to Comparative Literature.—Three times a week; both semesters. Professors Bernbaum, Aron, Carnahan, Oldfather, Van Horne; Associate Professors Parry, Hamilton; Assistant Professor Landis; Dr. Busey.

55a–55b. Survey of English Literature.—Three times a week; both semesters. Associate Professor Parry, Assistant Professor Finney.

57. Great Foreign Novelists in Relation to the English Novel.—Goethe, Hugo, Manzoni, Balzac, Dumas, Flaubert, Zola, Turgenev, Dostoevski, Tolstoi. Three times a week; first semester. Professor Bernbaum.

SPEECH

Courses for Graduates and Advanced Undergraduates

4. Advanced Debating.—Three times a week; both semesters. Associate Professor Sandford.

6. Forms of Public Address.—Three times a week; first semester. Associate Professor Sandford.

7. Masters of Public Address.—Three times a week; second semester. Associate Professor Sandford.

SCANDINAVIAN LANGUAGES

Preparation for major graduate work in the Scandinavian languages or literature must include a good knowledge of one of the Scandinavian languages and systematic work in the undergraduate courses in Scandinavian. Any graduate student in language may, however, be admitted to the purely philological courses.

Courses for Graduates

101. Old Norse.—Introduction to the language; grammar; reading of the Prose Edda in part, and selections from the sagas. Twice a week; first semester. *One unit.* (Not given in 1933-34.) Professor Flom.

110. Advanced Old Norse (Old Norse Poetry).—Critical study of the Poetic Edda. Twice a week; second semester. *One unit.* Professor Flom.

130. The Runic Inscriptions (Introduction to Primitive Germanic).—Twice a week; second semester. *One unit.* Professor Flom.

150. Research.—Special problems in Scandinavian philology or literature. Thesis. Once a week; both semesters. *One-half to two units.* Professor Flom.

ENTOMOLOGY

The prerequisite for graduate work in entomology is two years of undergraduate biology, including zoology and entomology. Entrance on major work in entomology requires at least six hours of entomology. A reading knowledge of French and German is desirable by the beginning of the second year.

Courses for Graduates

100. Research.—Once or twice a week; both semesters. *One-half to four units.*
- (a) Morphology and Embryology of Insects. Associate Professor Hayes.
- (b) Economic Entomology. Professor Metcalf.
- (c) Systematic Entomology. Professor Metcalf, Assistant Professor Balduf.
- (d) Biology and Ecology of Insects. Professor Metcalf.

107. Insect Anatomy.—Lectures and laboratory. Three times a week; both semesters. *One-half unit.* (Given in alternate years; not given in 1933-34.) Associate Professor Hayes.

Courses for Graduates and Advanced Undergraduates

6. Special Problems.—Once or twice a week; both semesters. Various instructors.

8c. Pests of Man and Domestic Animals.—Lectures and laboratory. Three times a week; second semester. (Given in 1933-34 and in alternate years.) Professor Metcalf.

10. Morphology and Taxonomy of Immature Insects.—Lectures and laboratory. Three times a week; both semesters. (Given in 1933-34 and in alternate years.) Associate Professor Hayes.

20. Insect Control.—Lectures and laboratory. Three times a week; first semester. Professor Metcalf.

21. Insect Bionomics.—Lectures and readings. Three times a week; second semester. Professor Metcalf.

GENETICS

Those desiring a general training in genetics may take a major or minor in botany or zoology. Those desiring to approach agricultural problems through genetics may take a major or minor in agronomy, horticulture, or animal husbandry. For courses in the subject see departments of Agronomy, Animal Husbandry, Botany, Horticulture, and Zoology.

GEOLOGY

For graduate work in geology the student must have had at least a major in geology and an acceptable field training. Other graduate students with adequate technical preparation may be admitted to certain graduate courses.

For graduate work in geography the student must have had at least the equivalent of a major in geography.

Courses for Graduates

102. Petrography.—Lectures; laboratory. Twice a week; both semesters. *One unit.* Professor Quirke.

122. Mountain and Continental Structures.—A study of the structure and dynamics of mountain ranges and of other areas having interesting structural problems. Three times a week; second semester. *One unit.* (Given in alternate years; not given in 1933-34.) Assistant Professor Shepard.

125. Sedimentation.—The interpretation of sedimentary rocks in terms of their origin. Twice a week; first semester. *One unit.* (Given in alternate years; not given in 1933-34.) Assistant Professor Wanless.

134. Advanced Studies in Geology.—Supervised individual study in metamorphism, pre-Cambrian geology, ore deposition, advanced paleontology, micropaleontology, geophysical prospecting, and other subjects, to be arranged with members of the department. *One-half to four units.*

135. Research.—Once a week; both semesters. *One-half to four units.* Professors DeWolf, Savage, Quirke, Blanchard; Associate Professor Howard; Assistant Professors Page, Sutton, Wanless.

142. Paleozoic Stratigraphic Paleontology.—The invertebrate index fossils of the successive geologic formations. Twice a week; both semesters. *One unit.* (Given in alternate years; not given in 1933-34.) Professor Savage.

143. Post-Paleozoic Stratigraphic Paleontology.—Stratigraphic study of post-Paleozoic formations with a consideration of characteristic fossils. Twice a week; both semesters. *One unit.* (Given in 1933-34 and in alternate years.) Assistant Professor Sutton.

151. Advanced Dynamic Geology.—A critical analysis of geologic processes and their results; the materials and structure of the earth; problems of geologic interpretations. Three times a week; first semester. *One unit.* (Given in alternate years; not given in 1933-34.) Assistant Professor Shepard.

152. Advanced Historical Geology.—Cosmogeny; the record of diastrophism; the development of the continents and oceans; the relationship between oceanic fluctuations and organic differentiation and evolution; physiographic, climatic, and organic history. Three times a week; second semester. *One unit.*

160. Petroleum Geology.—Twice a week; both semesters. *One unit.* (Given in alternate years; not given in 1933-34.) Associate Professor Howard.

161. Applied Petroleum Geology.—Twice a week; first semester. *One unit.* (Given in 1933-34 and in alternate years.) Associate Professor Howard.

163. Geologic Development of the Continents.—The paleography of continents other than North America, together with an outline of the geology of these continents as described in foreign geological literature. Three times a week; both semesters. *One unit.* (Given in alternate years; not given in 1933-34.) Associate Professor Howard.

Courses for Graduates and Advanced Undergraduates

15. Structural Geology.—Rock deformation and its results. Three times a week; second semester. (Given in 1933-34 and in alternate years.) Associate Professor Howard.

16. Stratigraphy.—Fossil faunas, with special reference to Paleozoic invertebrates. Three times a week; second semester. (Given in alternate years; not given in 1933-34.) Assistant Professor Sutton.

24. Field Methods and Mapping.—Once a week and three or four one-day field trips and one longer field trip. (Given in 1933-34 and in alternate years.) Assistant Professor Wanless.

38. Regional Geology of the United States.—The characteristics of individual geologic provinces. Three times a week; first semester. (Given in 1933-34 and in alternate years.) Associate Professor Howard.

49. Microscopic Petrography.—Five times a week; second semester. Professor Quirke.

60a–60b. Introduction to Research.—Two or four times a week; both semesters. Members of the department.

95. Economic Geology.—The nature, occurrence, origin, and uses of coal, oil, building stones, and bedded deposits of economic importance. Three times a week; first semester. (Given in 1933-34 and in alternate years.) Professor DeWolf.

96. Economic Geology.—The nature, occurrence, and origin of metaliferous deposits; theories of ore deposition. Three times a week; second semester. (Given in 1933-34 and in alternate years.) Professor Quirke.

GEOGRAPHY

Courses for Graduates and Advanced Undergraduates

8. Geography of Europe.—Three times a week; first semester. Professor Blanchard.

10. Geography of Africa.—Three times a week; first semester. (Given in alternate years; not given in 1933-34.) Assistant Professor Page.

11. Geography of Asia.—Three times a week; second semester. Dr. Poggi.

14a. Climate of the Continents.—Three times a week; second semester. (Given in alternate years; not given in 1933-34.) Assistant Professor Page.

53a–53b. Advanced Economic Geography.—Three times a week; both semesters. Professor Blanchard.

60a–60b. Introduction to Research.—See Geology 60a-60b.

GERMAN

Students desiring to take German as a major are required to have finished successfully a four-year course of undergraduate work in German, or its equivalent. They are also required to be familiar with the principal works of the writers of the classical and modern periods of German literature, to show a general knowledge of the history of German literature, and to be able to follow lectures in the German language.

Of collateral subjects, a reading knowledge of French is important and is required for advanced graduate work. Some acquaintance with Latin and with German history is highly desirable.

Courses for Graduates

101. Seminar in the Modern German Drama.—Twice a week; both semesters. *One unit.* Professor Aron.

102. Thesis.—Both semesters. *One-half to two units.* Professors Aron, Brooks; Associate Professor Williams; Assistant Professor Geissendoerfer.

103. Introduction to the Historical Study of the Germanic Languages.—History of German philology; comparative grammar of the old Germanic dialects. Twice a week; first semester. *One unit.* Associate Professor Williams.

105. Old High-German.—Grammar and interpretation of the oldest literary documents. Twice a week; second semester. *One unit.* Associate Professor Williams.

110. Early German Drama.—German drama up to the Reformation. Twice a week; second semester. *One unit.* Professor Brooks.

113. German Literature of the Fifteenth and Sixteenth Centuries.—Twice a week; first semester. *One unit.* Professor Brooks.

117. German Literature of the Seventeenth and Eighteenth Centuries.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Aron.

121a. The Nibelungenlied.—Twice a week; second semester. *One unit.* Associate Professor Williams.

Courses for Graduates and Advanced Undergraduates

19a–19b. Goethe's Faust.—The Faust legend and early Faust books and plays; the genesis of Goethe's *Faust;* reading of both parts. Twice a week; both semesters. Professor Brooks.

26a. German Literature up to 1800.—Three times a week; first semester. Professor Aron.

26b. German Literature since 1800.—Three times a week; second semester. Professor Aron.

31. Middle High German.—Twice a week; first semester. Associate Professor Williams.

32. History of German Civilization.—Three times a week; second semester. (Not given in 1933-34.) Professor Brooks.

HISTORY

Graduate work in history requires two years of college work in this subject, or sixteen semester hours, which should ordinarily include introductory courses in European and American history. Linguistic preparation is important, especially in French and German. For medieval history some knowledge of Latin is essential, and Spanish is useful for certain fields of American history.

Advanced courses in history at the University of Illinois are of three kinds: (1) Courses for information and guidance in general reading. (2) Instruction in methodology, historiography, and bibliography. A part of this work (in course 103) is required of all graduate students in history during their first year. (3) Seminary courses for the study of special fields with a view primarily to training in the methods of historical criticism and research.

Illinois Historical Survey.—Students of history have an opportunity to pursue research in western history in connection with the Illinois Historical Survey, which is an organization for the purpose of carrying on systematic studies in the history of Illinois.

Attention is also called to the fact that the University of Illinois has for some time coöperated with the Trustees of the State Historical Library in the gathering and editing of archive material. As a result of this relation instruc-

tors and graduate students in the department have contributed from time to time to the publications of the Library and have been given useful training in the study of manuscript as well as of printed material.

Higher Degrees in History.—The following statement regarding the specific requirements for higher degrees in history is subject to the general requirements of the Graduate School.

Master of Arts

In addition to meeting the usual tests in the specific courses taken, each candidate for this degree will ordinarily be required to pass a general written examination early in the year and toward the close of the second semester an examination, also written, in two of the following fields: ancient history; medieval history of continental Europe; modern history of continental Europe; English history; American history; Latin-American history. The candidates are expected to have a general knowledge of historical methods (see course 103). The department further requires a working knowledge of one important foreign language, ordinarily French or German.

Doctor of Philosophy

Major Requirements.—A candidate who selects history as his major subject may offer himself for examination in any four of the fields indicated below, stating also the particular field among these four in which he wishes to specialize and in which his thesis is to be written:

1. Ancient history. 2. Medieval history and institutions of continental Europe, to the close of the thirteenth century. 3. Continental Europe from 1300 to 1648. 4. Continental Europe and its dependencies since 1648 (except as included in 5 and 6). 5. The history of England and its dependencies (not including America before 1783). 6. The history of the United States. 7. The history of Latin America. This enumeration of fields is not to be regarded as excluding the possibility of accepting others as may be determined by the department in individual cases.

Minor Subjects.—A candidate for the doctorate in history may select as his first minor one of the divisions of the field of history listed above which is not offered as a part of his major. He should preferably, however, select his minors from subjects offered by other departments. The following list of suitable minors is intended to be suggestive rather than exhaustive or compulsory.

Political Science.—(Any two acceptable for a first minor; any one, for a second minor.) 1. International law and diplomacy. 2. Modern government. 3. Municipal government. 4. Constitutional and administrative law and jurisprudence. 5. Political theory.

Economics and Sociology.—(Any two acceptable for a first minor; any one, for a second minor.) 1. Economic history. 2. Economic theory. 3. Public and private finance. 4. Social reform. 5. Principles of sociology.

Philosophy and Education.—(Any two acceptable for a first minor; any one, for a second minor.) 1. History of ancient and medieval philosophy. 2. History of modern philosophy. 3. History of education.

Literature.—Some division of the history of literature which may be either comparative literature of a limited period or the literature of a particular country for a more extended period as may be agreed upon in each case.

Courses for Graduates

101. Seminar in American History.—Once a week; two hours; both semesters. *One unit.* Semester I: Introduction to research in American history. Professor Robertson. Semester II: Guidance in the investigation of selected topics. Professor Randall.

102. Seminar in English History.—A study of selected topics in the early modern period. Arrange hours; both semesters. *One unit.* Professor Dietz.

103. Historiography and Historical Method.—Required of all candidates for an advanced degree in history who do not present evidence of similar training elsewhere. Twice a week; first semester. *One unit.* Professor Randall.

104. Seminar in European History.—Once a week; two hours; both semesters. *One unit.* Professor Lybyer.

105. Research in Special Topics.—Guidance in writing theses for advanced degrees. *One to two units.* Professors Larson, Lybyer, Robertson, Pease, Jones, Randall, Dietz, Hansen; Associate Professors Swain, Rodkey; Assistant Professors Dunbar, Ronalds, Werner.

106. Seminar in the History of the Later Middle Ages.—Arrange hours; both semesters. *One unit.* Professor Larson.

122. History of the West.—An intensive study of the westward movement, 1760-1816. Twice a week; both semesters. *One unit.* Professor Pease.

126. Spain in Europe and America, 1750-1825.—Bibliography, historiography, and topical reports. Arrange hours; first semester. *One unit.* Professor Robertson.

127. Inter-American Relations.—Relations of the Latin-American nations with each other and with the United States. The Monroe Doctrine, intervention, etc. Arrange hours; second semester. *One unit.* Professor Robertson.

133. Studies in the History of Europe in the Nineteenth Century.—Once a week; two hours; both semesters. *One unit.* Associate Professor Rodkey.

138. History of France in the Sixteenth and Seventeenth Centuries.—Twice a week; both semesters. *One unit.* Professor Jones.

150. Seminar in Ancient History.—Problems in the relations of East and West. Arrange hours; both semesters. *One unit.* Associate Professor Swain.

Courses for Graduates and Advanced Undergraduates

16a–16b. The American Colonies in the Eighteenth Century and the Beginnings of National Life and Organization.—Three times a week; both semesters. Assistant Professor Dunbar.

17a–17b. Social and Economic Forces in the United States in the Nineteenth Century.—Three times a week; both semesters. Professor Hansen.

19a–19b. History of American Immigration.—Twice a week; both semesters. Professor Hansen.

20a–20b. History of the South.—Twice a week; both semesters. Professor Randall.

21. History of the United States since 1877.—Twice a week; first semester. Professor Robertson.

25. The Civil War and the Reconstruction.—Three times a week; first semester. Professor Randall.

26. History of the Latin-American Colonies.—Three times a week; first semester. Professor Robertson.

27. History of Latin America from the Wars of Independence to the Present Time.—Three times a week; second semester. Professor Robertson.

29. America and Europe, 1776-1870.—Foundations of international intercourse, with particular reference to the Latin-American colonies and states. Three times a week; second semester. Professor Robertson.

32a–32b. History of Europe since 1878.—Three times a week; both semesters. Professor Lybyer.

36a–36b. History of the German People in Medieval and Modern Times.—Three times a week; both semesters. Associate Professor Rodkey.

37a–37b. History of Eastern and Southern Asia.—Three times a week; both semesters. Professor Lybyer.

38a–38b. Development of the French Monarchy in the Later Middle Ages and in Early Modern Times, 1285-1648.—Three times a week; both semesters. (Not given in 1933-34.) Professor Jones.

39a–39b. The Renaissance and the Protestant and Catholic Reformations.—The transition from medieval to modern ideals. Three times a week; both semesters. Professor Jones.

44a–44b. Constitutional History of England.—Three times a week; both semesters. Professor Larson.

46a–46b. The Industrial Revolution and English Social Politics, 1750-1933.—Three times a week; both semesters. (Not given in 1933-34.) Professor Dietz.

47a–47b. History of England in the Later Middle Ages and in the Early Modern Period, 1399-1603.—Three times a week; both semesters. Professor Dietz.

55. History of the Ancient Greek States.—Three times a week; first semester. Professor Oldfather.

56. History of the Roman Republic.—Three times a week; second semester. (Not given in 1933-34.) Professor Oldfather.

57a–57b. Ancient Imperialism, Hellenistic and Roman.—Three times a week; second semester. Associate Professor Swain.

60. The United States in the World War.—Three times a week; second semester. Professor Randall.

62a–62b. Political and Constitutional Development of the United States.—Three times a week; both semesters. Professor Randall.

HOME ECONOMICS

As preparation for graduate work with a major in foods and nutrition the student must have had at least the equivalent of the foods and nutrition required in the undergraduate curriculum for the general major in home economics and, in addition, 3-5 hours in foods, dietetics, and nutrition; also quantitative chemical analysis.

As preparation for graduate work with a major in general home economics a student must have had the equivalent of the undergraduate curriculum for the general major in home economics, including a course in the principles of economics.

In addition to graduate courses in home economics the student will offer, for a major in foods and nutrition, either Chemistry 50a or 40 and 41, and for the general major, further courses in education, economics, or sociology.

Graduate students who choose home economics as a minor for the degree of Doctor of Philosophy must have had adequate preliminary preparation in foods and nutrition and must include among the courses to be taken for the minor either Home Economics 41 and 103 or 35 and 105, or must have had their equivalent. Of the courses open to advanced undergraduates, selection may be made from courses 20, 33, 35, 39a, 39b, and 41.

Courses for Graduates

101. Home Economics.—Twice a week; both semesters. *One unit.* Professor Wardall.

102. Research in Nutrition.—Both semesters. *One-half to three units.* Assistant Professor Outhouse.

103. Nutrition Seminar.—Once a week; both semesters. *One-half unit.* Assistant Professor Outhouse.

104. Research in Foods.—Both semesters. *One-half to three units.* Associate Professor Woodruff.

105. Foods Seminar.—Once a week; both semesters. *One-half unit.* Associate Professor Woodruff.

Courses for Graduates and Advanced Undergraduates

20. Infant Nutrition.—Twice a week; first semester. Assistant Professor Outhouse.

28. Organization and Management of the Household.—Twice a week; first semester. Assistant Professor Nickell.

31. Clothing.—Three times a week; second semester. Miss Whitlock.

33. Diet in Disease.—Three times a week; second semester. Assistant Professor Barto.

35. Problems in Foods.—Three times a week; second semester. Associate Professor Woodruff.

39a–39b. Readings in Food and Nutrition.—Once a week; both semesters. Associate Professor Woodruff; Assistant Professors Outhouse, Barto.

41. Problems in Nutrition.—Three to five times a week; second semester. Assistant Professor Outhouse.

43a–43b. Problems in Textiles and Clothing.—Three times a week; both semesters. Assistant Professors Jacobsen, Weaver; Misses Whitlock, Barnes.

45. Nutrition Classes.—Twice a week; second semester. Assistant Professor Barto.

48. Institutional Dietaries and Administration.—Three times a week; second semester. Assistant Professor Smith.

50. Costume Design.—Three times a week; second semester. Miss Barnes.

51. Textiles.—Twice a week; second semester. Assistant Professor Jacobsen.

55. Food and Nutrition.—Five times a week; first semester. Assistant Professor Outhouse.

56. Child Development.—Twice a week; second semester. Assistant Professor Walls.

57a–57b. Problems in Household Management.—Three times a week; both semesters. Assistant Professor Nickell.

HORTICULTURE

Graduate work is offered in the Department of Horticulture leading to the M.S. and Ph.D. degrees. Candidates may specialize for either degree in floriculture, olericulture, or pomology.

Twenty hours of collegiate work in horticulture and allied subjects are required for entrance upon major work, and twelve hours for minor work.

Courses for Graduates

103. Olericulture.—Once a week; both semesters. *One to two units.* Professor Lloyd.

105. Marketing Fruits and Vegetables.—See Agricultural Economics 135.

106. Olericulture Seminar.—Once a week; first semester. *One-fourth unit.* Professor Lloyd.

108. Pomology.—Three times a week; both semesters. *One to four units.*
(a) Pomological Problems.—Professor Blair.
(b) Pomology and Fruit Breeding.—Professor Dorsey.
(c) Pomological Physiology.—Professor Ruth; Assistant Professor Kelley.
(d) Small Fruits.—Professor Colby.
(e) Pomological Pathology.—Professor Anderson.

115. Floriculture.—Once a week; both semesters. *One to two units.*
(a) Floricultural Problems.—Professor Dorner.
(b) Floricultural Physiology and Pathology.—Associate Professor Weinard.

120. Pomology Seminar.—Once a week; both semesters. *One-fourth unit.* Professors Dorsey, Ruth, Anderson.

125. Fruit Development.—Three times a week; first semester. *One unit.* Professor Dorsey.

130. Physiology of Fruit Production.—Three times a week; first semester. *One unit.* Professor Ruth.

135. Fruit Disease Research.—Three times a week; first semester. *One unit.* Professor Anderson.

140. Advanced Small Fruit Culture.—Three times a week; second semester. *One unit.* Professor Colby.

Courses for Graduates and Advanced Undergraduates

12. Evolution of Horticultural Plants.—Three times a week; first semester. Professor Dorsey.

43. Greenhouse Fertilizers.—Three times a week; first semester. Associate Professor Weinard.

44. Current Pomological Literature.—For seniors and graduates specializing in pomology. Once a week; both semesters. Professor Ruth.

45. Plant Nutrition.—Three times a week; second semester. Associate Professor Weinard.

46. Marketing Horticultural Products.—See Agricultural Economics 36.

47. Fruit Storage.—The effects of environment upon fruits. The storage of fruits. Three times a week; first semester. Professor Ruth.

51. Fruit Diseases.—Three times a week; second semester. Professor Anderson.

LIBRARY SCIENCE

Candidates for the master's degree in library science must have completed at least thirty semester hours' work in library science in this institution or in an approved institution.

Students desiring to prepare for work in special types of libraries will be expected to include at least one unit of advanced courses in appropriate subjects other than library science. All such changes in the program of the student must be approved by the Director of the Library School.

Courses for Graduates

101. Thesis.—*One to two units.* Professor Windsor and others.

102. Seminar.—Both semesters. *One to three units.*
   (a) Techniques of the Study of Reading Interests.—Once a week; two hours; first semester. *One unit.* Assistant Professor Boyd.
   (b) College and University Library Administration.—Once a week; two hours; second semester. *One unit.* Professor Windsor.
   (c) Publishers.—(Not given in 1933-34.)
   (d) Special Libraries.—

103. Advanced Reference. — Twice a week; both semesters. *One-half unit.* Miss Phelps.

104. Advanced Cataloging and Classification.—Once a week; two hours; both semesters. *One-half unit.* Assistant Professor Bond.

Courses for Graduates and Advanced Undergraduates

7. History of Libraries.—Twice a week; second semester. (Not given in 1933-34.)

9. History of Books and Printing.—Twice a week; second semester. Professor Windsor.

13a. U. S. Government Publications.—Twice a week; first semester. Miss Phelps.

24a–24b. Book Selection for Special Groups.—Twice a week; both semesters. Miss Hostetter.

42. State and Foreign Government Publications.—Three times a week; second semester. Miss Phelps.

44. Bookbuying for the Large Library.—Twice a week; first semester. (Given in 1933-34 and in alternate years.) Miss Garver.

45. Library Buildings and Equipment. — Twice a week; second semester. Miss Gramesly.

46. High School Library Administration.—Three times a week; second semester. Miss Hostetter.

48. Public Library Administration. — Three times a week; first semester. Miss Gramesly.

MATHEMATICS

Students entering on graduate study with a major in mathematics must have had twenty hours of undergraduate work in mathematics besides the usual freshman courses in algebra, trigonometry, and analytic geometry, including a one-year course in calculus and one year of more advanced work in one or more of

the fields of algebra, analysis, and geometry. They should be able to read German or French.

Candidates for a doctor's degree taking a first minor in mathematics are expected to have completed a course in calculus and are required to take two one-year courses beyond the calculus; candidates for a doctor's degree taking a second minor are required to complete at least one course throughout a year beyond the calculus.

The more technical courses offered by the department are arranged mainly in cycles of two or of three years, so that a properly qualified student will usually have opportunity to take any particular course at some time during the three years of residence required for the doctor's degree.

Courses for Graduates

100. Seminar.—For thesis work, or for special reading with the consent of the instructor. Three times a week; both semesters. *One to two units.* Professors Carmichael, Emch, Coble; Associate Professors Crathorne, Hazlett, Lytle; Assistant Professors Levy, Brahana. For the master's degree: Assistant Professor Bailey; Dr. Steimley, Dr. Ketchum, Dr. Bourgin, Dr. Pepper.

101. Functions of Real Variables.—Three times a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Carmichael.

110. Elliptic Functions.—Three times a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Carmichael.

112. Linear Difference Equations.—Three times a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Carmichael.

113. Linear Differential Equations.—Three times a week; both semesters. *One unit.* Professor Carmichael.

124. The Theory of Numbers.—First semester: Theory of congruences and residues. Second semester: Theory of algebraic numbers. Three times a week; both semesters. *One unit.* (Not given in 1933-34.) Associate Professor Hazlett.

126. Theory of Groups.—Introductory course. Three times a week; second semester. *One unit.* (Not given in 1933-34.)

129. Theory of Statistics.—The mathematical theory underlying statistics with applications to problems in economics, biology, and sociology. Three times a week; both semesters. *One unit.* (Not given in 1933-34.) Associate Professor Crathorne.

131. Algebraic Geometry.—Three times a week; both semesters. *One unit.* Professor Coble.

135. Differential Geometry.—Three times a week; both semesters. *One unit.* Assistant Professor Levy.

139. Analysis Situs.—Three times a week; both semesters. *One unit.* (Not given in 1933-34.) Assistant Professor Brahana.

141. Vector Methods.—Three times a week; both semesters. *One unit.* (Not given in 1933-34.) Dr. Ketchum.

170. Algebra.—Three times a week; both semesters. *One unit.* Associate Professor Hazlett.

171. Analysis.—Three times a week; both semesters. *One unit.* Dr. Ketchum.

172. Geometry.—Three times a week; both semesters. *One unit.* Professor Emch.

Courses for Graduates and Advanced Undergraduates

16–17. Differential Equations and Advanced Calculus.—Three times a week; both semesters. Assistant Professor Bailey, Dr. Steimley.

21. Theory of Probability.—Three times a week; second semester. Associate Professor Crathorne.

22. Statistics.—May be counted only toward a minor in mathematics. Three times a week; first semester. Associate Professor Crathorne.

30–31. Actuarial Theory.—Three times a week; both semesters. Associate Professor Crathorne.

32. History of Mathematics.—Three times a week; second semester. (Not given in 1933-34.) Associate Professor Lytle.

35. Teachers' Course.—May be counted only toward a minor in mathematics. Three times a week; both semesters. Associate Professor Lytle.

36. Advanced Aspects of Euclidean Geometry.—Three times a week; first semester. Associate Professor Lytle.

40. Fundamental Concepts of Mathematics.—Three times a week; second semester. Associate Professor Lytle.

52. Differential Equations of Mathematical Physics.—Three times a week; both semesters. Dr. Bourgin.

53. Integral and Operational Equations in Mathematical Physics.—Three times a week; both semesters. (Not given in 1933-34.) Dr. Bourgin.

60. Introduction to the Theory of Numbers.—Three times a week; second semester. (Not given in 1933-34.) Dr. Pepper.

70. Introduction to Higher Algebra.—Three times a week; both semesters. Assistant Professor Brahana.

71. Introduction to Higher Analysis.—Three times a week; both semesters. Dr. Pepper.

72. Introduction to Higher Geometry.—Three times a week; both semesters. Professor Coble.

MECHANICAL ENGINEERING

The prerequisite for graduate work in mechanical engineering is the equivalent of the undergraduate course required for the degree of Bachelor of Science in mechanical engineering in the branches of the subject in which registration is desired.

Courses offered to junior and senior students are open for minor credit to students majoring in other departments.

Courses for Graduates

107. Thermodynamics.—Twice a week; both semesters. *One unit.* Associate Professor Goff.

108. The Flow of Fluids and Heat Transfer.—Twice a week; both semesters. *One unit.* Professor Macintire.

109. Machine Design.—Twice a week; both semesters. *One unit.* Professor Leutwiler.

112. Laboratory Investigations.—Three times a week; both semesters. *One and one-half units.* Professors Willard, Kratz, Polson, Ham, Macintire.

MINING ENGINEERING

The prerequisite for graduate work in mining engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in mining in the branches of the subject in which registration is desired.

Courses for Graduates

101. Advanced Mining Practice.—Twice a week; either semester. *One unit.* Professor Callen.

102. Advanced Preparation of Coal and Ores.—Twice a week; either semester. *One unit.* Assistant Professor Mitchell.

104.[1] Mining Reports.—Twice a week; either semester. *One unit.* Professor Callen.

105.[1] Welfare Work and Education among Mine Employees.—Twice a week; either semester. *One unit.* Professor Callen.

106.[1] Advanced Coal, Ore, and Metallurgical Plant Design.—Twice a week; second semester. *One unit.* Assistant Professor Mitchell.

107.[1] Advanced Non-Ferrous Metallurgical Projects.—Twice a week; either semester. *One unit.* Assistant Professor Mitchell.

Courses for Graduates and Advanced Undergraduates

6. Mechanical Engineering of Mines.—Three times a week; first semester. Professor Callen.

8. Mine Administration.—Three times a week; first semester. Mr. Nicholson.

9. Preparation of Coal and Ores.—Three times a week; first semester. Assistant Professor Mitchell.

16. Non-Ferrous Ore Treatment.—The reduction of gold, silver, copper, lead and zinc ores. Five times a week; second semester. Assistant Professor Mitchell.

15. Mine Ventilation.—Twice a week; second semester. Professor Callen.

20. Mine Ventilation Laboratory.—Twice a week; second semester. Professor Callen.

21. Mine Examination and Valuation.—Three times a week; second semester. Mr. Nicholson.

41. Principles of Mining and Metallurgical Design.—Three times a week; first semester. Assistant Professor Mitchell.

42. Mining and Metallurgical Design.—Twice a week; second semester. Assistant Professor Mitchell.

64. Mining Laboratory.—Twice a week; second semester. Assistant Professor Mitchell.

PHILOSOPHY

Students who enter on graduate work with philosophy as their major subject must have had a general course in the history of philosophy, a course in logic, and a general course in psychology.

[1] Of courses 104 and 105 only one will be given either semester, according to election of students; the same applies to courses 106 and 107.

Courses for Graduates

103. Ethics.—Twice a week; first semester. *One unit.* (Not given in 1933-34.) Professor Morrow.

105. Seventeenth Century Continental Thought.—Twice a week; first semester. *One unit.* Assistant Professor Gotshalk.

106. English and American Idealism.—Twice a week; second semester. *One unit.* (Not given in 1933-34.) Professor Morrow.

108. Plato.—Twice a week; first semester. *One unit.* Professor Tawney.

110. Locke, Berkeley, Hume.—Twice a week; second semester. *One unit.* Assistant Professor Gotshalk.

112. German Idealism.—Twice a week; second semester. *One unit.* Professor Tawney.

119. Seminar in Ancient and Medieval Philosophy.—Twice a week; first semester. *One unit.* Professor McClure.

120. Seminar in Modern Philosophy.—Twice a week; second semester. *One unit.* Professor McClure.

Courses for Advanced Undergraduates and Graduates

3. History of Ancient and Medieval Philosophy.—Three times a week; first semester. Assistant Professor Nicholson.

4. History of Modern Philosophy.—Three times a week; second semester. Assistant Professor Gotshalk.

7. Ethics.—Three times a week; first semester. Professor Tawney.

8. Philosophy of the Recent Past.—Three times a week; first semester. Assistant Professor Nicholson.

9. Political and Social Ethics. — Three times a week; second semester. Professor Tawney.

10. Philosophy of Science.—Three times a week; first semester. Assistant Professor Gotshalk.

12. Philosophy of Art.—Three times a week; first semester. Assistant Professor Gotshalk.

16. Metaphysics.—Three times a week; second semester. Assistant Professor Gotshalk.

22. American Philosophy (Royce, James, Santayana, and Dewey).—Three times a week; second semester. Dr. DeLargy.

PHYSICS

A year of calculus and a year of general physics, with laboratory, are prerequisite for all major and minor graduate work in physics. In addition, graduate students majoring in physics must have had one more advanced course in either physics or mathematics and should be able to use references in German.

Courses for Graduates

104a–104b. Electric and Magnetic Measurements.—Twice a week; three hours; both semesters. *One unit.* (Not given in 1933-34.) Professor Knipp, Associate Professor Williams.

122. Dynamics.—Four times a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Kunz.

123. Dynamical Theory of Sound.—Three times a week; second semester. *One unit.* Professor Watson.

124. Conduction of Electricity through Gases.—Three times a week; second semester. *One unit.* Professor Knipp.

125. Hydrodynamics. — Especially modern problems in flow and turbulence. Twice a week; both semesters. *One-half unit.* (Not given in 1933-34.) Professor Kunz.

126. Theory of Elasticity.—Three times a week; second semester. *One unit.* (Not given in 1933-34.) Professor Kunz.

127. Relativity.—Three times a week; both semesters. *One unit.* (Not given in 1933-34.) Dr. Mott-Smith.

128. Problems and Methods in Theoretical Physics.—Three times a week; first semester. *One unit.* Dr. Mott-Smith.

129. Mechanical Vibrations.—The general theory, with applications to plates, rotating shafts, gyroscopes, structures, etc. Twice a week; both semesters. *One-half unit.* (Not given in 1933-34.) Professor Kunz.

131a. Physical Laboratory Technique. — Especially glassblowing and discharges in gases. First semester. *One unit.* Professor Knipp.

131b. Physical Laboratory Technique.—Especially spectroscopic light sources and electronic phenomena. Second semester. *One unit.* Assistant Professor Kruger.

146. Electrodynamics.—Four times a week; both semesters. *One unit.* Professor Kunz.

147. Electric Oscillations.—Twice a week; both semesters. *One-half unit.* (Not given in 1933-34.) Professor Kunz.

163. Statistical Mechanics.—Three times a week; second semester. *One unit.* Dr. Mott-Smith.

170. Light.—Largely physical optics and spectroscopy. Lectures, assigned readings and recitations, with laboratory experiments. Both semesters. *One to two units.* Dr. Almy.

184. Line Spectra and Atomic Structure.—Three times a week; first semester. *One unit.* Professor Loomis.

185. Band Spectra and Molecular Structure.—Three times a week; second semester. *One unit.* Professor Loomis.

186a–186b. Quantum Mechanics.—Three times a week; both semesters. *One unit.* Assistant Professor Bartlett.

190. Research.—Both semesters. *One to three units.* Professors in the department.

198. Seminar.—Magnetism. Both semesters. *One to two units.* Professors in the department.

199. Physics Colloquium.—Attendance is expected of all graduate students. Once a week; both semesters. *No credit.* Professor Loomis.

Courses for Graduates and Advanced Undergraduates

14a–14b. Theoretical Mechanics.—Three times a week; both semesters. Dr. Mott-Smith.

15. Electricity and Magnetism.[1]—Recommended to students in non-technical courses who wish a knowledge of electricity and magnetism beyond the course in general physics. Two recitations or lectures and one three-hour laboratory exercise weekly; second semester. (Not given in 1933-34.) Associate Professor Williams.

[1]This course may not be taken for major credit.

17. Light.[1]—Recommended to students in non-technical courses. Two lectures and a three-hour laboratory period weekly; first semester. Associate Professor Schulz.

23. Sound.—Three times a week; first semester. Professor Watson.

25. Architectural Acoustics.—Twice a week; second semester. Professor Watson.

30. Introduction to Theoretical Electricity.—For advanced students in physics, chemistry, mathematics, and engineering. Three times a week; first semester. Associate Professor Williams.

44a–44b. Electrical and Magnetic Measurements.—Two three-hour periods a week; both semesters. Professor Knipp; Associate Professor Williams.

46. Advanced Electrical Measurements.—Two times a week of three hours each; second semester. (Not given in 1933-34.) Associate Professor Williams.

51. Practical Optics.—Three times a week; second semester. Associate Professor Schulz.

60. Heat.—Three times a week; first semester. Dr. Sanders.

61. Heat Laboratory.—To accompany Physics 60. One three-hour period a week; first semester. Dr. Sanders.

62. Kinetic Theory of Heat and Radiation.—Three times a week; second semester. Dr. Sanders.

71a–71b. Light.—For advanced students in physics, chemistry, mathematics or engineering. Twice a week; both semesters. Dr. Almy.

72a–72b. Light Laboratory.—To accompany Physics 71a-71b. Twice a week; both semesters. Dr. Almy.

78. X-rays.—Three times a week; second semester. (Not given in 1933-34.) Dr. Sanders.

PHYSIOLOGY

The prerequisites for graduate work in physiology are Physiology 1 or 4, 2 and 6 or equivalent.

Courses for Graduates

101. Journal Club.—Review of literature. Both semesters. *One-fourth unit.* Associate Professor Burge.

102. Research.—Both semesters. *One to two units.* Associate Professor Burge.

103. Special Phases of the Physiology of Respiration, Circulation, Digestion, Metabolism, Excretion, Secretion, Glands of Internal Secretion, Nervous System.—Both semesters. *One-half to one unit.* Associate Professor Burge.

Course for Graduates and Advanced Undergraduates

9. Physiology of the Special Senses.—Three times a week; first semester. Associate Professor Burge.

POLITICAL SCIENCE

Graduate work in political science is conducted in the following special fields: (1) political theory; (2) international law and diplomacy; (3) modern

[1]This course may not be taken for major credit.

government; (4) constitutional law, administrative law, and jurisprudence; (5) municipal administration.

To be admitted to take political science as a major subject, the student must have done at least 18 hours of undergraduate work in political science, economics, and history, not less than nine hours of which have been in political science. To take political science as a minor he must have had at least nine hours' work in these fields, including six hours in political science.

If a student making political science his major is taking both of his minors in other departments, one of them must be in history, economics, or sociology.

Several courses given in other departments are so closely related to those in political science that graduate students whose major is political science may be permitted on petition to take such courses as part of their major work. Attention is called to the courses in public law in the College of Law, the courses in city planning given by the College of Fine and Applied Arts, and the technical courses in municipal and sanitary engineering in the College of Engineering.

Courses for Graduates

101. History of Political Theories.—Three times a week; first semester. *One unit.* Professor Garner.

102. The Nature of the State.—Twice a week; second semester. *One unit.* Professor Fairlie.

103. Seminar in Political Science and Public Law.—Once a week; both semesters. Members of the department.

104. Municipal Administration.—Twice a week; second semester. *One unit.* Professor Fairlie.

105. Constitutional Law: Research in Selected Topics.—Twice a week; first semester. *One unit.* Professor Mathews.

106a–106b. Special Topics in International Law.—Research course. Twice a week; both semesters. *One unit.* Professor Garner.

107. Foreign Relations of the United States.—Twice a week; first semester. *One unit.* (Not given in 1933-34.) Professor Mathews.

108. Problems of International Organization.—Special problems in the field of international organization, with special attention to the League of Nations. Twice a week; first semester. *One unit.* Professor Berdahl.

112. Studies in Public Administration.—Special topics in national, state, or local administration in the United States. Twice a week; first semester. *One unit.* Professor Fairlie.

114. Studies in Political Parties.—Twice a week; second semester. *One unit.* Professor Berdahl.

121. Problems in British Administration.—Once a week; time to be arranged. *One unit.* Professor Fairlie.

Courses for Graduates and Advanced Undergraduates

4. Municipal Government.—Three times a week; first semester. *Associate* Professor Kneier.

5. The American Constitutional System.—Three times a week; first semester. Professor Mathews.

6a. International Law.—Three times a week; first semester. Professor Garner.

6b. International Law.—(Continuation of 6a.) Three times a week; second semester. Professor Garner.

7. American Foreign Relations.—Three times a week; second semester. Professor Mathews.

8. International Organization.—Twice a week; first semester. Professor Berdahl.

9. Principles of Jurisprudence.—Three times a week; second semester. Professor Fairlie.

11. Constitutional Aspects of Social and Industrial Problems.—Three times a week; second semester. Assistant Professor Hyneman.

12. Public Administration.—Three times a week; first semester. Professor Fairlie.

13. Government Regulation of Business.—Three times a week; first semester. Assistant Professor Hyneman.

14a. Political Parties: Party History and Issues.—Three times a week; second semester. (Alternates with Political Science 14b.) Professor Berdahl.

14b. Political Parties: Party Organization and Methods.—Three times a week; first semester. (Not given in 1933-34; alternates with Political Science 14a.) Professor Berdahl.

18. Legislation in the United States.—Three times a week; second semester. (Not given in 1933-34.)

21. British Government.—Twice a week; first semester. Professor Fairlie.

22. Continental European Governments.—The constitutions and political systems of the principal countries of continental Europe. Three times a week; second semester. Professor Garner.

28. Current Governmental Problems.—Twice a week; second semester. Professor Mathews.

32. Principles of Political Science.—Twice a week; second semester. Professor Fairlie.

34. Municipal Problems.—Municipal administration in the United States and Europe. Three times a week; second semester. Associate Professor Kneier.

PSYCHOLOGY

Graduate students who elect psychology as their major subject must have had standard courses, of university grade, both in general psychology and in the psychological laboratory. One general university course is the minimal requirement for graduate students who apply to the department for a minor subject.

Courses for Graduates

102. Translation of Psychological Treatises.—Critical reading of French and German books and articles. Both semesters. *One-half unit.* Professor Woodrow.

103. Research.—Experimental investigations. Both semesters. *One-half to two units.* Professor Woodrow; Associate Professors Culler, Young; Assistant Professor Higginson.

105. Seminar.—Discussion of current topics in their historical setting, with especial emphasis upon research problems. Both semesters. *One unit.* Professor Woodrow.

106. Neural Theory of the Psychological Functions. — First semester. *One unit.* Associate Professor Culler.

108. Quantitative Methods. — The logic of research methods in psychology. First semester. *One unit.* (Not given in 1933-34.) Associate Professor Culler.

Courses for Graduates and Advanced Undergraduates

5. Comparative Psychology.—A systematic survey of animal behavior with particular reference to the behavior of the vertebrates. Laboratory and discussion. Three times a week; first semester. Dr. McAllister.

8. Feeling and Emotion. — A critical analysis of the facts, problems, and methods of affective psychology, with special reference to recent physiological studies. Twice a week; second semester. Associate Professor Young.

9. Physiological Psychology.—The physiological basis of conscious experience. Twice a week; second semester. (Not given in 1933-34.) Associate Professor Young.

10. Mental and Physical Work.—The psychology of work and the factors affecting it, with special reference to work in industry. Twice a week; second semester. Dr. Ruch.

11. Learning and Comprehension. — Processes and functions in acquiring knowledge and skill. Twice a week; first semester. Associate Professor Culler.

12-13. Minor Problems (Advanced Laboratory).—Application of methods suitable to new problems in general and comparative psychology. Three times a week; both semesters. Professor Woodrow; Assistant Professor Higginson; Dr. McAllister.

14. Social Psychology.—Psychological factors in the control of group behavior and the adjustment of the individual to social situations. Three times a week; second semester. Dr. Lindsley.

16. Genetic Psychology.—The psychological development of the individual with special reference to childhood. Twice a week; first semester. Dr. Ruch.

17. The History of Psychology.—Three times a week; second semester. Associate Professor Young.

18. Perception.—Perceptual experience; recent revisions of perceptual theory including the doctrine of the *Gestalt.* Lectures and discussions. Twice a week; second semester. Associate Professor Culler.

20. Systematic Psychology.—A critical study of contemporary systems: behaviorism, *Gestalt psychologie,* structural, functional and dynamic psychology. For seniors and graduates. Twice a week; second semester. Professor Woodrow.

21. Character and Personality.—An analysis of the non-intellectual aspects and determinants of mentality and conduct, with special applications to behavior problems and personnel psychology. Three times a week; first semester. Dr. Sears.

23. Abnormal Psychology. — Analytical consideration of types of behavior deviating from the normal. Three times a week; second semester. Dr. Sears.

26. Recent Experimental Problems (Thought).—Recent experimental methods and results. Twice a week; first semester. Dr. McAllister.

28. The Psychology of Motivation.—Instinct, drive, desire, habit, and attitude as determinants of behavior; mental conflicts and types of adjustment. Twice a week; first semester. Associate Professor Young.

34. Individual Differences.—A study of the variation in the mental characteristics of individuals and of groups. Three times a week; first semester. Professor Woodrow.

RAILWAY ENGINEERING

The prerequisite for graduate work in railway engineering is the equivalent of the undergraduate courses required for the degree of Bachelor of Science in railway engineering in the branch of the subject in which registration is desired.

Certain courses offered senior students are open to graduates for minor credit. Courses 5 and 8 (Railway Laboratory) may be taken among major subjects.

Courses for Graduates

102. Locomotive Design.—Once a week; either semester. *One unit.* Professor Young.

106. Locomotive Operation.—Once a week; either semester. *One unit.* Professor Schmidt.

110. Railway Location.—Twice a week; either semester. *One unit.* Professor King.

ROMANCE LANGUAGES AND LITERATURE

A student entering on graduate work for an advanced degree must have had at least three years of college work in his major subject, including one advanced literary course.

Students who enter with a knowledge of Latin and of a second Romance language, together with a reading knowledge of German, will find their work for an advanced degree greatly facilitated.

FRENCH

Courses for Graduates

101. Old French Literature.—Twice a week; both semesters. *One unit.* Professor Oliver.

102. Villon, Rabelais, Montaigne, La Pléiade.—Twice a week; both semesters. *One unit.* Assistant Professor Will.

103. Seventeenth Century Literature.—Twice a week; both semesters. *One unit.* Professor Oliver.

104. Eighteenth Century Literature.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Oliver.

127. French Romanticism.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Carnahan.

128. Origin and Development of the Novel in France.—Twice a week; both semesters. *One unit.* Professor Carnahan.

132. French Lyric Poetry.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Michaud.

133. La Poésie de Victor Hugo.—Twice a week; both semesters. *One unit.* Professor Michaud.

144. Le Réalisme et le Naturalisme Français.—(In French.) Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Michaud.

145. Doctrines Littéraires et Courants d'Idées Contemporains.—(In French.) Twice a week; both semesters. *One unit.* Professor Michaud.

175. Old French Phonology and Morphology.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Oliver.

195. Seminar.—Research work in preparation for theses in French. Both semesters. *One to two units.* Members of the department.

Courses for Graduates and Advanced Undergraduates

10a–10b. General Survey of French Literature.—Three times a week; both semesters. Professor Carnahan.

17a–17b. French Drama of the Nineteenth Century.—Twice a week; both semesters. Associate Professor Hamilton; Assistant Professor Will.

24a–24b. French Drama of the Seventeenth and Eighteenth Centuries.—Three times a week; both semesters. Professor Oliver.

29a–29b. Modern French Poetry.—Twice a week; both semesters. (Not given in 1933-34.) Assistant Professor Jacob.

32a–32b. The French Novel in the Nineteenth Century.—Three times a week; both semesters. Assistant Professor Jacob.

33a–33b. La Littérature Contemporaine.—(In French.) Twice a week; both semesters. (Not given in 1933-34.) Professor Michaud.

34a–34b. La Comédie Humaine de Balzac.—(In French.) Twice a week; both semesters. Professor Michaud.

ITALIAN

Courses for Graduates

140. Italian Literature in the Middle Ages. Petrarch, Boccaccio.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Van Horne.

143. Italian Literature in the Renaissance.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Van Horne.

146. Modern Italian Literature.—Twice a week; both semesters. *One unit.* Professor Van Horne.

195. Seminar.—Research work in preparation for theses in Italian. Both semesters. *One to two units.* Professor Van Horne.

Course for Graduates and Advanced Undergraduates

3a–3b. Dante: The Divine Comedy.—Twice a week; both semesters. Professor Van Horne.

SPANISH

Courses for Graduates

130. Spanish Literature in the Sixteenth Century.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Associate Professor Hamilton.

131. Spanish Literature in the Seventeenth Century.—Twice a week; both semesters. *One unit.* Professor Van Horne.

134. Spanish Literature in the Eighteenth Century.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Associate Professor Hamilton.

135. La Novela Española Moderna.—(In Spanish.) Twice a week; both semesters. *One unit.* Associate Professor Balseiro.

137. La Crítica Literaria en España.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Associate Professor Balseiro.

138. Spanish-American Literature.—Twice a week; both semesters. *One unit.* (Not given in 1933-34.) Professor Van Horne.

185. Old Spanish Readings.—Twice a week; both semesters. *One unit.* Associate Professor Hamilton.

195. Seminar.—Research work in preparation for theses in Spanish. Both semesters. *One to two units.* Members of the department.

Courses for Graduates and Advanced Undergraduates

10a–10b. General Survey of Spanish Literature.—Three times a week; both semesters. Associate Professor Hamilton.

11a–11b. Cervantes: Don Quixote.—Twice a week; both semesters. Professor Van Horne.

17a–17b. El Teatro Español Moderno.—Twice a week; both semesters. Associate Professor Balseiro.

SOCIOLOGY

Preparation for major work in sociology must include at least the equivalent of twenty-three semester hours in the social and biological sciences, of which at least eight must be in sociology. The remaining fifteen hours may be distributed among economics, philosophy, history, psychology, political science, and biology (heredity). A thesis is required of all candidates for the master's and the doctor's degrees. Preparation for graduate work in sociology as a minor requires at least six hours of credit in sociology.

Theses subjects may be chosen from any one of the following divisions of the sociological field: General and historical sociology; personality studies; culture theory and culture change; population studies; community studies; social pathology and social adjustment.

Courses for Graduates

100. Sociological Theory.—Twice a week; second semester. *One-half to one unit.* Associate Professor Hiller.

102b. More Recent Developments in Sociology.—Twice a week; second semester. *One unit.* (Not given in 1933-34.) Associate Professor Hiller.

106. Urban Communities and Urbanization.—Twice a week; second semester. *One unit.* Assistant Professor Tylor.

107. Rural Communities.—Twice a week; second semester. *One unit.* Assistant Professor Tylor.

108. Research in the Social Effects of Poverty, and Their Prevention and Treatment.—Twice a week; first semester. *One unit.*

109. Research in Criminology.—Twice a week; first semester. *One unit.* Professor Taft.

110. Population.—Twice a week; second semester. *One unit.* Professor Taft.

124. Advanced Penology.—Twice a week; second semester. *One unit.* Professor Taft.

128. Fusion of Culture Resulting from Immigration.—Twice a week; second semester. *One unit.* Associate Professor Hiller.

129. Modern Human Migrations.—Twice a week; second semester. *One unit.* (Not given in 1933-34.) Professor Taft.

150. Seminar.—Preparation of theses. *One-half to two and one-half units.* Members of the department.

Courses for Graduates and Advanced Undergraduates

General Courses

3. Social Evolution.—Three times a week; first or second semester. Mr. Ahrens.

4. Social Control.—Twice a week; first or second semester. Assistant Professor Albig.

6. Urban Sociology.—Three times a week; first semester. Assistant Professor Tylor.

7. Rural Sociology.—Three times a week; second semester. Assistant Professor Tylor.

Specialized Courses

8. Charities.—Three times a week; first or second semester. Assistant Professor Timmons.

9. Criminology.—Three times a week; first or second semester. Professor Taft.

10. Problems of Population.—Three times a week; second semester. Associate Professor Hiller.

14. Group Opinion.—Three times a week; first semester. Assistant Professor Albig.

17. Methods of Sociological Research.—Three times a week; first semester. Associate Professor Hiller.

24. Penology.—Three times a week; second semester. Professor Taft.

27. Community Organization.—Three times a week; second semester. Assistant Professor Timmons.

28. Immigration and Assimilation.—Three times a week; second semester. Associate Professor Hiller.

29. Modern Human Migrations.—Three times a week; first semester. (Not given in 1933-34.) Professor Taft.

30. Races of Mankind.—Three times a week; first semester. (Not given in 1933-34.)

40. Ethnology of the American Indians.—Three times a week; first semester. (Not given in 1933-34.)

42. Early Civilizations.—Three times a week; second semester. (Not given in 1933-34.)

44. Negro Origins.—Three times a week; second semester. (Not given in 1933-34.)

45. Prehistoric Archeology.—Three times a week; first semester. (Not given in 1933-34.)

THEORETICAL AND APPLIED MECHANICS

The prerequisite for the courses for graduates in theoretical and applied mechanics is the equivalent of the undergraduate courses in theoretical and applied mechanics required for the degree of Bachelor of Science in engineering.

Courses offered to senior students are open for minor credit to students majoring in other departments.

Courses for Graduates

101. The Development of Basic Ideas in Mechanics.—Twice a week; second semester. *One unit.* Professor Moore.

103. Hydraulics.—Twice a week; either semester. *One unit.* Professor Enger.

107. Laboratory Investigations in Strength of Materials.—Twice a week; both semesters. *One to two units.* Professor Moore.

108. Laboratory Investigations in Hydraulics.—Twice a week; both semesters. *One to two units.* Professor Enger.

109. Laboratory Investigations in Plain and Reinforced Concrete.—Twice a week; both semesters. *One to two units.* Professor Richart.

110. Analytical Study of Experimental Work on Reinforced Concrete.—Beams, frames, and footings. Twice a week; first semester. *One unit.* Professor Richart.

111. Analytical Study of Experimental Work on Reinforced Concrete.—Columns and slabs. Twice a week; second semester. *One unit.* Professor Richart.

112. Structural Mechanics.—Three times a week; first semester. *One unit.* Professor Westergaard.

113. Graphical and Approximate Methods of Structural Analysis.—Twice a week; second semester. *One-half unit.* Professor Westergaard.

114. Theory of Elasticity with Applications to Engineering Problems.—Three times a week; first semester. *One unit.* Professor Westergaard.

115. Theory of Elasticity with Applications to Engineering Problems (Continuation of 114).—Twice a week; second semester. *One unit.* Professor Westergaard.

116. Resistance of Materials.—Twice a week; first semester. *One unit.* Professor Seely.

117. The Properties of Engineering Materials.—Twice a week; second semester. *One unit.* Professor Seely.

Courses for Graduates and Advanced Undergraduates

41. Advanced Mechanics of Materials.—Three times a week; first semester. Professor Seely.

42. Engineering Materials.—Three times a week; second semester. Professor Seely.

43. Laboratory Work in Hydraulics.—Twice a week; second semester. Professor Enger.

44. Laboratory Work in Testing Materials.—Three times a week; first semester. Professor Moore, Associate Professor Putnam.

TRANSPORTATION

Transportation may be taken as a major or minor for the master's degree and as a minor for the doctorate. No student will be admitted to graduate work in transportation unless he has a satisfactory acquaintance with the principles of economics and in addition such knowledge of the general problems of transportation as is represented by the content of the undergraduate course on the transportation system of the United States.

Course for Graduates

100. Economics of Transportation.—Once a week; both semesters. *One unit.* Assistant Professor Locklin.

Courses for Graduates and Advanced Undergraduates

3. Industrial Traffic Management.—Three times a week; second semester. Assistant Professor Locklin.

7. Railroad Finance.—Three times a week; second semester. Assistant Professor Locklin.

8. Railroad Organization.—Twice a week; first semester.

10. Railroad Rates.—Three times a week; first semester. Assistant Professor Locklin.

16. Railroad Operation.—Three times a week; second semester.

22. Ocean Shipping.—Three times a week; first semester. Professor Litman.

26. Transportation Problems.—Three times a week; second semester. Assistant Professor Locklin.

ZOOLOGY

At least sixteen semester hours of college work in zoology are required for entering on major graduate study in this subject. Under special circumstances advanced work in closely allied subjects may be accepted in lieu of the fourth semester's work in zoology. When zoology is chosen for a minor the courses listed for graduates and undergraduates must be preceded by at least one full year's undergraduate work in zoology.

For the prosecution of graduate study in zoology a reading knowledge of German and French is indispensable and familiarity with Latin and Greek is of great advantage.

Graduate students specializing in zoology are strongly advised to spend at least one summer in study at the seashore. Every candidate for the doctor's degree will be required to furnish evidence of having completed satisfactorily at least one eight-week period in such work at an approved location. To facilitate this plan an investigator's room has been provided at the Woods Hole

Marine Biological Laboratory, where members of the department are offered research facilities without cost to themselves. Application for the use of this room should be made to the head of the department early in the year. Similar facilities are sometimes afforded at other marine laboratories.

Students interested in the field of genetics are referred especially to courses 115 and 124.

Courses for Graduates

102. Evolution of the Vertebrates.—Twice a week; first semester. *One-half unit.* (Given in 1933-34 and in alternate years.) Assistant Professor Adams.

106. Topics in Embryology.—Twice a week; both semesters. *One unit.* Professor Shumway.

107. Parasitology.—Once or twice a week; both semesters. *One unit.* (Given in alternate years; not given in 1933-34.)

109. Physiological Ecology.—Twice a week; second semester. *One-half to one unit.* (Given in alternate years; not given in 1933-34.) Professor Shelford.

110. Economic Ecology.—Twice a week; second semester. *One-half to one unit.* (Given in 1933-34 and in alternate years.) Professor Shelford.

111. Experimental and Field Ecology.—Both semesters. *One-half to two units.* Professor Shelford.

115. Factors of Individual and Racial Development.—Twice a week; both semesters. *One unit.* Professor Zeleny.

117. Faunistic Zoology.—Taxonomy and distribution, with especial reference to the local fauna. Twice a week; first semester, *one unit;* second semester, *one-half to one unit.* Professor Van Cleave.

127. Theories of Animal Phylogeny.—Relations of various groups of animals; signification of so-called intermediate forms; invertebrate larval forms and theories of descent based on them. Once or twice a week; both semesters. *One unit.* (Not given in 1933-34.)

Individual Research Courses

121. Invertebrate Morphology and Parasitology.—*One to two units.* Members of the department.

122. Vertebrate Morphology.—*One to two units.* Assistant Professor Adams.

123. Faunistic and Systematic Zoology.—*One to two units.* Professor Van Cleave.

124. Experimental Zoology and Genetics.—*One to two units.* Professor Zeleny.

125. Animal Ecology and Behavior.—*One to two units.* Professor Shelford.

126. Vertebrate Embryology.—*One to two units.* Professor Shumway.

Courses for Graduates and Advanced Undergraduates

11. Experimental Ecology and Geography.—Three or four times a week; first semester. Professor Shelford.

17. Field Zoology.—Twice a week; first semester. Professor Van Cleave.

18. Introduction to Protozoology.—Twice a week; second semester. Assistant Professor Kudo.

19. Advanced Ornithology.—Twice a week; first or second semester. Assistant Professor Cahn.

20a–20b. Current Investigations. — Must be taken by all graduate students majoring in zoology. Once a week; both semesters. Members of the department.

21a–21b. Introduction to Zoological Research.—Two to five times a week; both semesters. Members of the department.

22–23. Morphology of Vertebrates.—Two to four times a week; both semesters. Assistant Professor Adams.

31. Introduction to Parasitology.—Twice a week; first semester. Assistant Professor Thomas.

63. Comparative Vertebrate Embryology.—Two to five times a week; first semester. Professor Shumway.

66. Ontogeny of Vertebrates.—Two to five times a week; second semester. Professor Shumway.

INDEX

Accountancy, 21
Admission, 9
Agricultural Economics, 24
Agricultural Experiment Station, 18
Agronomy, 26
Animal Husbandry, 27
Architecture, 29
Astronomy, 29

Bacteriology, 30
Botany, 30
Business Law, 33
Business Organization and Operation, 32

Calendar, 6
Ceramic Engineering, 33
Changes in study-lists, 10
Chemistry, 34
Civil Engineering, 39
Classics, 40
Courses open to graduate students, 10, 23
Credit, graduate courses, 12
  undergraduate courses, 10

Dairy Husbandry, 41
Degrees, application for, 13
  Doctor's, 15
  Masters', 11
  Professional, in Engineering, 14
Deposit, for laboratory material, 21
  for printing thesis, 17
Doctor's degree, 15
  examinations, 17
  in engineering, 18
  language requirements, 16
  period of study, 15
  preliminary examinations, 16
  residence, 15
  thesis, 17
  work in other universities, 15
  (For special regulations, see name of department, as Classics, History, etc.)

Economics, 42
Education, 45
Electrical Engineering, 46
Engineering, doctor's degree in, 18
  master's degree in, 14
  professional degrees in, 14
    Architectural, 14, 29
    Ceramic, 14, 33
    Civil, 14, 39
    Electrical, 14, 46
    Mechanical, 14, 61
    Mining, 14, 62
    Physics, 14, 63
    Railway, 14, 69
Engineering Experiment Station, 18
English Language and Literature, 46
Entomology, 50
Examinations for doctor's degree, 16
Executive Faculty, 8
Expenses, 21

Faculty, Executive, 8
Failures, 11, 14
Farm Organization and Management, see Agricultural Economics.
Fees, 21
Fellowships, 19
Final examination for doctor's degree, 17
Foreign language requirements, 12, 16
French, 69

Genetics, 50
Geography, 52
Geology, 50
German, 52
Grades, 13
Graduate Club, 22
Greek, 40

History, 53
Home Economics, 56
Horticulture, 58

Incidental fee, 21
Italian, 70

Laboratory fees, 21
Language and Literature, English, 46
  Germanic, 52
  Romance, 69
  Scandinavian, 49
Language, requirement, Doctor's degree, 16
  Master's degree, 12
Latin, 40
Libraries, 19
Library Science, 49
Listeners' courses, 10

Majors, 12, 15, 16, 17
Marine biological laboratories, 12
Master of Arts, degree of, 11
  (See also special requirements of various departments, as Economics, Chemistry, etc.)
Master of Science, degree of, 12
Master's degree in Engineering, 14
Mathematics, 59
Matriculation fee, 21
Mechanical Engineering, 61
Mechanics, Theoretical and Applied, 73
Medical Science, summer work in, 11
Meterology, *see* Geology
Mineralogy, *see* Geology
Mining Engineering, 62
Minors, 12, 15, 16, 17
Miscellaneous courses, 10

Organization of Graduate School, 9

Philosophy, 62
Physics, 63
Physiology, 65
Political Science, 65
Preliminary examinations for doctor's degree, 16
Professional degrees in Engineering, 14
Psychology, 67
Public Speaking, *see* Speech
Public Utilities, *see* Economics

Railway Engineering, 69
Registration, 9
Residence study, 11, 15
Romance Languages and Literature, 69

Scandanavian Languages, 49
Scholarships, 19
Seniors and graduate study, 10
Sociology, 71
Spanish, 71
Speech, 49
Staff, students on, 11
Study-lists, changes in, 10
  fee for late changes, 21
Summer study, 11

Theoretical and Applied Mechanics, 73
Thesis, Doctor's, 17
  Master's, 13
Transfer of graduate credit, 12
Transportation, 74
Trustees, Board of, 5
Tuition, 21

Visitors, 10

Withdrawal, 11

Zoology, 74

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